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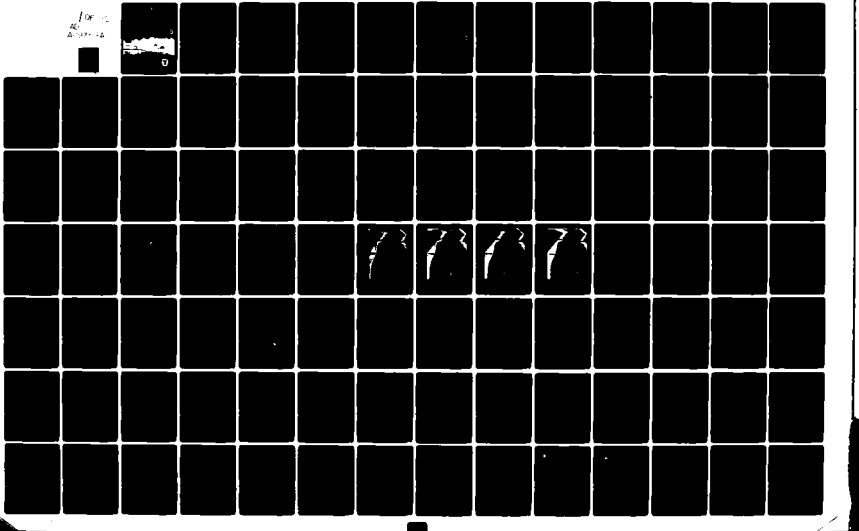

LEVEL II

ABBREVIATED DETAILED PROJECT REPORT

MITIGATION OF EROSION DAMAGES

DELAWARE RIVER
PENNSVILLE, NEW JERSEY

DECEMBER 1980

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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Shore Protection
River banks

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The purpose of this detailed project study and report was to determine how much shoreline erosion damage was attributable to a dike constructed at Pennsville, NJ on the Delaware River and to investigate possible solutions to the control of the bank erosion. Of the several design alternatives presented it was proposed to reinforce the existing steel bulkhead at Pennsville NJ by the provision of rubble-toe protection which would have a 13 foot top width at elevation 4.5 NGUD and a face which would extend to the existing ground on a 2:1 slope.

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(6) ABBREVIATED DETAILED PROJECT REPORT

MITIGATION OF EROSION DAMAGES

DELAWARE RIVER

PENNSVILLE, NEW JERSEY.

PHILADELPHIA DISTRICT

CORPS OF ENGINEERS

PHILADELPHIA, PENNSYLVANIA 19106

(11) DEC[redacted]1980

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U.S. CUSTOM HOUSE, 2ND & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

NAPEN-P

SUBJECT: Abbreviated Detailed Project Report on Erosion Damages along the Delaware River at Pennsville, New Jersey.

TO: Division Engineer
North Atlantic Division, Corps of Engineers
ATTN: NADPL-F
New York, New York 10007

STUDY AND REPORT

PURPOSE AND AUTHORITY

A 1979 survey investigation of the Delaware Bay Shore of New Jersey indicated that a training dike, constructed at Pennsville by the Corps to reduce shoaling in the Federally-dredged channel of the Delaware River, Philadelphia-to-the-Sea project, contributes to shoreline erosion damage. The investigation also indicated that a detailed feasibility study was warranted for a Federal project to mitigate that damage, and concluded that the feasibility study could be made under the special continuing authorities program for mitigation of Federal project-caused damages. The purpose of this detailed project study and report is to determine how much shoreline erosion damage is attributable to the dike, to investigate alternative solutions and to describe and recommend the best mitigation plan alternative.

This report is submitted pursuant to authority contained in Section 111 of the 1968 River and Harbor Act as part of the Continuing Authorities Program.

STUDY AREA AND SCOPE OF STUDY

Pennsville Township is located about 30 miles southwest of Philadelphia, PA and Camden, NJ in Salem County along the left bank of the Delaware River. The study area comprises the township's shoreline, extending from about one-half mile upstream of the Delaware Memorial Bridge to the Salem River, five miles downstream of the bridge. The study area location is shown on Plate 1.

Study analyses were based primarily on existing information. Additional model studies were not considered warranted because they might not furnish any additional meaningful information, and also because of their high cost compared to estimated project construction costs. Some river current pattern data was available from model studies conducted in 1941 for training dike construction and in 1963 for dike rehabilitation.

Because of existing conditions in the project area, the number of alternative solutions that could be practically considered are limited. However, several plans were evaluated, including alternative rubble-toe protection sections, replacement with a heavier and deeper bulkhead, a breakwater structure and removal of the training dike.

The investigation of each alternative considered both its engineering and economic feasibility and the social, environmental and economic effects it would have on the study area.

DEVELOPMENT AND ECONOMY

The populations of Salem County and Pennsville Township were estimated in 1974 by the state as 61,400 and 13,711, respectively. Pennsville has the largest population of the county's 15 townships.

The county economy is derived from a combination of industry and agriculture. The manufacturing industry is the largest employer and employs about half the total labor force. The chemical and food processing industries are the major manufacturing employers. Over half of the county's total land area is currently used for agriculture. Vegetable farms are the greatest cash producers, followed closely by dairy farms.

The growth of Salem County industry has been slow since World War II because the county was relatively isolated until the Delaware Memorial Bridge and the New Jersey Turnpike were completed. The Salem County Planning Board projects significant residential and industrial growth in Pennsville Township and the gradual reduction of agriculture.

COORDINATION OF STUDY

This study has been coordinated with Pennsville Township, the State of New Jersey and the U.S. Fish and Wildlife Service. In addition, the findings from the investigation and the selected plan were presented at a Public Meeting in the Pennsville Township Hall on 23 October 1980.

Pennsville Township endorsed the rubble-toe protection plan proposed for the steel bulkhead that extends from a point upstream of Jenkins Avenue to Beach Avenue. Comments by the Township on the proposed plan are contained in letters dated 28 May and 12 November 1980. Copies of those letters are included in the Correspondence Appendix.

The State of New Jersey also concurred with the measures provided in the proposed plan. Their comments are furnished in a letter dated 19 November 1980.

The U.S. Fish and Wildlife Service (USFWS) evaluated the proposed mitigation project in a letter dated 26 February 1980. The USFWS report concluded that the project will generally replace unproductive sandy beach with a more productive rocky shoreline. The diversity of aquatic habitat will be increased and the project will have an overall positive impact on the environment. Fish and Wildlife Service final comments on the recommended plan were furnished in a letter dated 17 October 1980. Copies of their letters are also included in the Correspondence Appendix.

PRIOR STUDIES AND REPORTS

The following are brief descriptions of prior studies and reports that provided both general background and specific hydraulic information for this study.

- Study authorization for the 1947 report on the Model Study of Plans for Elimination of Shoaling in Deepwater Point Range was contained in the Chief of Engineers' indorsement of 10 September 1940. The project design was selected, construction was completed, and the prototype effect was evaluated.
- The 1964 Delaware River and Bay, Pennsylvania, New Jersey and Delaware Study was made in partial response to Public Law 71 of 15 June 1955 and also in response to resolutions adopted by both Congressional Committees on Public Works in 1951. The report recommended that no project for tidal flooding protection be considered at that time.

- The Delaware River at Pennsville, NJ Study was authorized by a 1955 resolution of the House Committee on Public Works. It requested the Corps to determine the dike's effect on area river depths and shorelines, and also to determine the advisability of undertaking local navigation improvements at that time. The investigation was terminated in 1967 because the Pennsville Pier was no longer used for navigation and because the shoreline was almost completely protected by a steel bulkhead.
- The 1971 National Shoreline Study's authorization was contained in Section 106 of the 1968 River and Harbor Act. The report developed needed protection plans and suggested priorities for nationwide action. The North Atlantic Region was shown to have the greatest percentage of critical erosion of nine national regions. Within this ten-state region, New Jersey was fifth in number of miles of critical erosion, none of which was judged likely to endanger life or public safety within five years. Pennsville and Villas (Miami Beach) were identified as areas having erosion damages along heavily-developed shorelines.
- The 1979 Beach Erosion Control and Hurricane Protection, Delaware Bay Shore, New Jersey Study was authorized by a 1972 resolution by the House of Representatives' Committee on Public Works. It identified Pennsville as the only damage center in the three-county study area that warranted further detailed study at the time.

  The report recommended that the feasibility of a Pennsville Federal erosion control project be investigated under Section 111 of the 1968 River and Harbor Act.

- The 1980 New Jersey Shore Protection Master Plan, September draft, included Pennsville in the Delaware River study reach. This study concluded that a program of construction and maintenance of shore parallel structures should be implemented for this reach on a case-by case basis. The Master Plan also acknowledges the Corps of Engineers study of the erosion problems at Pennsville.

PROBLEMS AND NEEDS

In order to evaluate Pennsville's shoreline erosion and bulkhead damage problems and to determine the degree of Federal responsibility for their solution, this study explored the history of the training dike and its effect on both the shoreline and the protective bulkhead erected by local interests.

DIKE CONSTRUCTION DESCRIPTION AND PURPOSE

The 5300-foot all-stone training dike was constructed by the Corps in 1942-43 to reduce shoaling in the Deepwater Point Range of the Delaware River navigation channel. The locations of the training dike and the affected portion of the Deepwater Point Range are shown on Plate 2.

The dike extends from the shoreline at Benson Avenue downstream on a 25-degree angle to Oriental Avenue. It then continues parallel to the shoreline and ends at a point 1200 feet downstream of Lakeview Avenue.

Since construction, the shoreline landward of the dike has experienced recurring erosion damages. Pennsville Township and the State of New Jersey constructed a steel bulkhead in 1956-1965 (construction schedule was in accordance with appropriation of funds) to protect most of the shoreline. Subsequent erosion has caused the bulkhead to fail at several locations.

Except for the Benson Avenue vicinity, where the dike meets the shoreline, the dike settled from its original top elevation of 5.1 feet, National Geodetic Vertical Datum (NGVD), to 0.0 feet NGVD by 1956 and to -3.0 feet NGVD by 1963. At that time, the average elevation was restored to an elevation of 0.0 feet NGVD by adding stone from the shoreline to a point 240 feet downstream of Beach Avenue, and by using a cribbing technique from that point to the end of the dike.

HYDRAULIC ANALYSIS

The dike was originally constructed to conform with the results of 1941 model studies conducted by the Waterways Experiment Station (WES), and post-completion records proved that it effectively reduced local channel shoaling as anticipated.

As mentioned above, the dike settled an average of eight feet in the 20 years following construction. Poor dike foundation conditions posed a potential obstacle to restoring the dike to its original elevation. In 196_, therefore, additional model tests were performed to determine if rehabilitating the dike to a lower-than-original elevation would restore its effectiveness. Test results showed that an average elevation of 0.0 feet NGVD would be just as effective as the original elevation, and consequently the dike was restored to that level the same year.

Neither the 1941 nor the 1963 model studies were intended to investigate the shoreline changes caused by the dike. However, in both sets of tests, the dike was shown to have affected the natural beach nourishment process that had existed prior to construction. Also, surface flow current patterns observed during the tests indicated probable shoreline current changes and potentially changed shoaling/scouring patterns.

The 1941 model tests for training dike design show surface current patterns for a top elevation of 5.1 feet NGVD. During flood tides, according to test results, eddies would be created within and just north of the dike which induce and localize sediment shoaling. Sediment sources include river bottom sediments and those eroded from the shoreline by circular eddy currents. During ebb tide, an eddy would form just south of the dike which also could erode the shoreline. Plates 3 through 6 show surface current patterns for the shoreline both with and without the training dike. The dike intercepts the normal littoral drift that nourishes the lee shoreline. Flood tide eddies have developed shoals offshore while also contributing to shoreline scour. During ebb tide, the dike protects shoals in its lee and prevents them from nourishing the shoreline. The dike also prevents the shoals formed to its immediate north from nourishing the shoreline.

Model tests made in 1963 for dike rehabilitation show surface current patterns for a top elevation of 0.0 feet NGVD (see Plates 7 and 8). Currents entering the dike-protected area during the flood tide cross the shoaled area and the dike to re-enter the river. The dike continues to deflect river currents during ebb tide and prevents them from nourishing the shoreline landward of the dike.

AVAILABLE SURVEY DATA

Available survey data includes profiles taken in 1932, 1942, 1956 and 1979. These Delaware River profiles were taken perpendicular to the Pennsville shoreline at five locations to evaluate shoreline changes that have taken place since the alteration of current patterns. Three of the profiles were taken landward of the dike at Jenkins, Beach and Lakeview Avenues and one

each was taken upstream and downstream of the dike at Ash Road and Quaker Road, respectively. The locations of all five profiles are shown on Plate 2. The profiles themselves are shown on Plates 9 through 13.

EVALUATION OF SHORELINE CHANGES

Although the Pennsville shoreline has experienced periods of both erosion and accretion since dike construction, it has sustained a net loss of 4.5 feet of material in the 37 years since construction. Prior to 1932, both the shoreline and offshore area landward of the dike were at least stable, and in some cases actually experienced accretion. Following dike construction, offshore shoaling increased dramatically and the beach elevation dropped.

In those areas investigated upstream (Ash Road) and downstream (Quaker Road) of the dike, erosion of the shoreline had been occurring prior to dike construction and, therefore, was not considered attributable to it. The effect on river current patterns diminishes with distance from the dike.

The analysis of both historic data and the river current pattern changes observed during model tests demonstrates that erosion-causing eddy currents have developed landward of the dike. However, these changes have apparently not caused an increased erosion rate along the shoreline located outside the dike.

For the purposes of this report the study area is divided into three reaches, as shown on Plate 2, and the shoreline located beyond the limits of the dike, which experience varying degrees of change caused by the dike, as follows:

- Reach A
- Reach B
- Reach C

Reach A, the shoreline landward of the dike from Beach Avenue to 1300 feet upstream, experiences erosion damage attributable to the dike. Reach B includes the shoreline from Beach Avenue to Riverview Beach Park, 1,400 feet downstream. Riverview Beach Park shoreline is Reach C. The effect of the dike on the river offshore of Reaches B and C is diminished because Reach B is protected and Reach C is relatively undeveloped along the shoreline.

Reach A is the only one of the three reaches that experiences erosion damages which are directly attributable to the dike and are eligible for measures under the mitigation authority. The steel bulkhead that protects this reach has not been effectively reinforced with rubble-toe protection, except for one 100-foot section. Consequently, erosion has severly damaged the bulkhead, which has failed at several locations.

Mitigation measures are not necessary for Reach B since this reach is already protected by a steel bulkhead that is reinforced with rubble-toe protection. Since these measures are considered entirely adequate and no further problem is expected, this section was not analyzed any further. As stated above, Reach C fronts Riverview Beach Park. The park, which was originally an amusement park, has not been operated or maintained for over ten years and the wooden bulkhead which originally protected it has deteriorated beyond rehabilitation. Although protection is required only in connection with proposed recreation development of the park, this section was analyzed concerning its eligibility for mitigation measures. The analysis showed that measures are not warranted under the mitigation authority. However, the township and the state developed a plan to provide additional recreation facilities and protective measures (armor mat on 2:1 slope) along the park shoreline.

Another joint township-state project to provide protection for a section of steel bulkhead upstream of the dike from Churchlanding Road to Ash Road was completed in November 1980. Gabion revetment was provided for this 1400-foot shoreline section, which has experienced erosion damage in the past. Gabions are considered adequate for this section because the erosion damage in that reach is less severe than that occurring landward of the dike.

The reach from Benson Avenue, where the dike meets the shoreline, to a point 400 feet upstream of Jenkins Avenue was not included in the above analysis because the sand accretion it experiences makes protection measures unnecessary. Based on existing data, Reach A is the only shoreline section eligible for Federally-funded mitigation measures.

BULKHEAD HISTORY AND DAMAGE

Following dike construction, both the township and property owners who lived along the shoreline reported that it caused erosion damage landward of the dike. Protective measures were constructed jointly from 1956 to 1965 by Pennsville Township and the New Jersey Department of Environmental Protection along most of the developed Pennsville shoreline. They had to undergo emergency repairs by the township following erosion-caused failures at several locations. In addition to those repairs, the township and the state reinforced the bulkhead in Reach B in 1971 with a rubble-toe protection project which has a 13-foot top width at elevation 4.5 feet NGVD. The bulkhead's failure in Reach A prompted the two governments to solicit Corps assistance in providing protection for Reach A.

PLAN FORMULATION

INTRODUCTION

Existing conditions in the problem area limit the number of alternative measures considered at Pennsville. In addition to the training dike offshore, the close proximity of homes to the shoreline, and the existing steel bulkhead along the shoreline, some sections of the bulkhead have been reinforced with rubble-toe protection. Therefore, measures that would require cutting the existing vertical embankment back on a slope are not practical. However, several alternative plans were considered, along with their environmental, social and economic effects and technical aspects. The evaluation was conducted in accordance with the Water Resources Council's Principles and Standards for Planning Water and Related Land Resources.

The following criteria were adopted for use in formulating the alternatives considered:

Technical

a. Each alternative should protect from further erosion damage those portions of the shoreline which have erosion damage directly attributable to the dike.

b. Each alternative should be consistent with local and state plans for shoreline protection.

Economic

a. The scope of the development should provide maximum net benefits.

b. There should be no more economical means, evaluated on a comparable basis, of accomplishing the same purpose or purposes which would be precluded from development if the plan were undertaken. This limitation

refers only to those alternative possibilities that would be physically displaced or economically precluded from development if the project is undertaken.

c. The benefits and costs should be expressed in comparable quantitative economic terms to the maximum extent practicable. The costs of alternative plans of improvement are based on October 1980 prices. Annual charges are based on a 50-year amortization period and an interest rate of 7-3/8 percent. The annual charges also include the cost of maintenance.

Environmental and Social Well-Being

Each alternative should:

a. Promote public health and safety.

b. Present an aesthetically pleasing appearance.

c. Avoid detrimental environmental effects, specifically eliminating or minimizing the following where applicable:

(1) Air, noise and water pollution.

(2) Destruction or disruption of man-made and natural resources, aesthetic values, community cohesion, and the availability of public facilities and services.

(3) Adverse employment effects, and tax and property value losses.

(4) Injurious displacement of people, businesses and farms.

(5) Disruption of desirable community and regional growth.

EVALUATION OF ALTERNATIVE PLANS AND SELECTED PLAN

Reach A

The following alternatives were considered in formulating the best plan to mitigate erosion damages for the area considered.

- o Removing the training dike. The dike effectively reduces shoaling in the navigation channel. If it were removed, the benefits associated with reduced costs for maintenance of the navigation channel would be lost. In addition to the increased navigation channel maintenance costs that would result from dike removal, the dike's large size and high removal costs made this alternative impractical. Accordingly it was not considered further.
- o Replacement of the existing steel bulkhead with one that would not be significantly affected by shoreline scour is not economically, feasible because only an extremely heavy and deep bulkhead would withstand existing scour conditions without rubble-toe protection.
- o An offshore breakwater would not be economically justified. The existing training dike is similar to a breakwater and experience has shown that such a structure would not provide effective protection in this area. The large amount of settlement that has occurred along the dike indicates that foundation conditions offshore are not suitable for construction of a breakwater.
- o Rubble-toe protection would stabilize the shoreline in the critical area along the bulkhead and reinforce the bulkhead against overturning forces.
- o The no-action alternative would cause recurring failure of the steel bulkhead if erosion protection measures are not provided. The repairs made to it thus far have not restored it to pre-storm conditions, and township residential properties would be eroded and/or inundated if the bulkhead were breached.
- o THE SELECTED PLAN. The practicable alternatives were evaluated to determine their engineering and economic feasibility. Details of the design analysis are included in Appendix A. Evaluation of the

bulkhead replacement alternative showed that it would not be economically justified. Two rubble-toe protection sections were developed as alternatives for reinforcing the existing steel bulkhead. The first was designed to be large enough to resist wave action. Computations to determine the size of armor stone for rubble-toe protection are shown in Appendix A, page A - 3. The calculated minimum weight of a single stone (W) is 373 pounds. However, 1/2 ton minimum to 2 ton maximum is specified to match the size of stone used in the adjacent township/state toe-protection project. Based on that size stone, a 5-foot top width section is required. However, not enough space is available landward of the bulkhead for construction equipment and this alternative would have to be constructed from the riverside of the bulkhead with greater expense and difficulty because of river stages (a four-foot depth along the bulkhead) and tide fluctuations (of up to 5.5 feet). Periodic maintenance for this plan would also involve greater expense and difficulty.

The second rubble-toe protection alternative was considered the more reasonable of the two in terms of both structural integrity and method of construction. It could be built in front of a crane operating from the top of the section. This rubble-toe protection section, which would have a 13-foot top width at elevation 4.5 feet NGVD and a face which would extend to the existing ground on a 2:1 slope, was the selected plan. Although its first construction costs would be higher than those of the 5-foot top width section, its maintenance costs would be lower. Typical sections of the rubble-toe protection sections evaluated for Reach A are shown on Plate 14. Since it is

larger than the minimum size required to satisfy current design criteria, it provides both a safety margin against possible project failure and allows for longer intervals between required maintenance.

Reach B

Our analysis of the existing steel bulkhead and rubble-toe protection in this reach, showed that it provides adequate protection and further measures are not required.

Reach C

The analysis of alternatives for protecting Riverview Beach Park showed that a stone revetment plan is the best alternative for protecting that shoreline. A typical stone revetment section is shown on Plate 15.

EFFECTS OF SELECTED PLAN

ENVIRONMENTAL EFFECTS

An environmental assessment was prepared on the erosion damage mitigation measures proposed for Pennsville. As noted previously, the U.S. Fish and Wildlife Service reported that the rocky shoreline created would increase the diversity of aquatic habitat and would have an overall positive environmental impact. The plan to reinforce the steel bulkhead along Reach A with rubble-toe protection, therefore, qualifies as the Environmental Quality (EQ) plan. As anticipated based on preliminary investigation, the environmental assessment showed that the proposed mitigation plan is not a major action that significantly affects the quality of the human environment. Consequently, it is recommended that an Environmental Impact Statement not be prepared. The environmental assessment is included as Appendix B.

PROJECTED BENEFITS

The benefits that would result from implementation of the proposed project in Reach A are:

a. The possibility of flooding will be reduced for residential properties located between the shoreline and Broadway.

b. Recurring erosion damage to both the shoreline and the existing steel bulkhead in the project area will be reduced.

c. The high costs for maintenance and periodic emergency rehabilitation of the bulkhead will be reduced.

d. The rocky shoreline provided by the project will increase the diversity of aquatic habitat and have an overall positive environmental impact.

These benefits are described in greater detail below.

Flood Reduction Benefits

The existing bulkhead protects part of the residential area of Pennsville from flooding damages due to storm tide stages up to 8.5 feet NGVD. That elevation provides protection for events up to a 37-year tide stage. (As shown on Plate 15, the 100-year tide stage is about 9.6 feet NGVD.) However, continuing erosion has caused damaged to the existing steel bulkhead. In 1970 erosion advanced to the stage that it caused partial failure of the bulkhead. Emergency measures were undertaken at that time to restore the protection and to prevent a rapid spreading of the bulkhead failure. Due to adverse working conditions during storms and the close proximity of homes to the bulkhead, emergency measures did not restore the bulkhead in accordance with current design criteria. Subsequent emergencies involving partial bulkhead failures were also experienced in five of the ten years between

1970 and 1980, with similar results. Due to the continuing erosion damage and the recurring bulkhead failures, the steel bulkhead and tie-back system is continually deteriorating. It is estimated that the deterioration will reach the stage that it can no longer be rehabilitated within seven years. If complete failure of the bulkhead occurs, floodwaters could inundate low-lying properties in the two-block area between the river and Broadway. With the addition of the proposed rubble-toe protection, the steel bulkhead would be stable throughout the life of the project. Therefore, flood reduction benefits attributable to the rubble-toe protection revetment project are claimed for the years 7 through 50.

The estimated average annual flooding damages without the steel bulkhead are $13,900, based on a damage-versus-frequency curve developed for this damage reach. That curve is based on the tide-versus-frequency curve for the Delaware River, a survey of first floor elevations of properties and a real estate appraisal of their value 1/. Standard Federal Insurance Administration stage-versus-damage curves for typical structures are applicable in the study area. The stage-versus-frequency and stage-versus-damage curves are shown on Plates 16 and 17, respectively. Based on a 7 3/8% interest rate and a 50-year project life, benefits for reduction of structural flooding damages are computed as follows:

$13,900 x 12.923 (USPW, 43 years) = $179,630

$179,630 x .60768 (PWF, 7 years) = $109,157

$109,157 x .0759135 (CRF, 50 years) = $8,287

1/ The real estate analyses for this report was furnished by staff appraisers of the Baltimore District. Initial report was performed in March 1979 and updated in November 1980.

Benefits for reduction of contents damages are computed similarly as follows:

$8,107 x 12.923 (USPW, 43 years) = $104,771

$104,771 x .60768 (PWF, 7 years) = $63,667

$63,667 x .0759135 (CRF, 50 years) = $4,833

The affluence factor was applied to contents using the growth rate of per capita income for the non-SMSA portion of BEA economic area 15 as presented in the OBERS series. Growth is limited to the year where contents rise to 75 percent of the value of the structure. The initial ratios of contents to structure for properties in the study area range from 20 to 50 percent, based on surveys, depending on the value of the structure. Therefore, the year where contents rise to 75 percent of the value of the structure varies for the different structures.

Total benefits attributable to the affluence factor are $1,422. Total benefits for contents are $6,255.

However, a portion of the flood reduction benefits are associated with properties located along the shoreline that are assumed will be abandoned after the bulkhead fails. It is assumed that three homes would be abandoned within one year and an additional home abandoned within ten years (19 additional homes subject to erosion are high enough that flood reduction benefits were not claimed) after failure of the bulkhead.

Since flood reduction benefits for those homes following their abandonment for the period mentioned amount to $980, that amount was subtracted from the total estimated flood reduction benefits.

Total average annual flood reduction benefits:

Flood reduction benefits for structures	$ 8,287
Flood reduction benefits for contents	6,255
Reduction of benefits for homes abandoned	- 980
Total	$13,562
Rounded total	$13,600

Erosion Reduction Benefits

Although 23 homes along the shoreline in back of the bulkhead are now high enough to be affected by only unusually high tide stages, they would have to be abandoned if the bulkhead failed. Fifteen of them, valued at $353,219, including land and improvements (total value) would have to be abandoned within the first year following failure. Another, about 50 feet from the bulkhead (estimated total value: $42,900), would have to be abandoned within five years following failure. The remaining seven, about 70 feet from the bulkhead (estimated total value: $291,400) would have to be abandoned within ten years following failure. Benefits for reducing erosion damages are computed utilizing the conservative assumption that all of the land between the shoreline and the structure is lost the year that the structure is lost. After the structure is lost there is a residual value associated with the remaining land. This residual value is estimated at $2,000 per property.

Benefits for reducing erosion damages are computed as follows:

$353,219 x 0.5659 (PWF, 8 years) = $199,887

$199,887 x 0.0759 (CRF, 50 years) = $ 15,171

$43,110 x 0.4258 (PWF, 12 years) = $ 18,356

$18,356 x 0.0759 (CRF,50 years) = $ 1,393

$292,825 x 0.2983 (PWF, 17 years) = $ 87,350

$87,350 x 0.0759 (CRF, 50 years) = $ 6,630

Total erosion reduction benefits = $23,194

The residual value is computed as follows:

15 x $2,000 x 0.5659 (PWF, 8 years) =	$16,977
$16,977 x 0759 (CRF, 50 years) =	$ 1,289
$2,000 x 0.4258 (PWF, 12 years) =	$ 852
$852 x .0759 (CRF, 50 years) =	$ 65
7 x $2,000 x 0.2983 (PWF, 17 years) =	$ 4,176
$4,176 x .0759 (CRF, 50 years) =	$ 317
	$ 1,671

Total erosion reduction benefits =	$23,194
	-1,671
	$21,523
Rounded Total	21,500

Maintenance and Emergency Rehabilitation Reduction Benefits

Due to shoreline erosion, the costs for bulkhead maintenance and emergency rehabilitation following storm events have amounted to an average of $12,200 each year for the last five years. It is estimated that the cost for each of the next seven years would at least equal this amount if rubble-toe protection is not provided for the bulkhead. Benefits for cost reduction for maintanance and emergency costs are:

12,200 x 5.3195 (USPW, 7 years) =	64,898
(CRF, 50 years) =	4,926
Rounded total =	4,900

Total benefits for reinforcing the steel bulkhead are:

Flood Reduction Benefits	= $13,600
Erosion Reduction Benefits	= 21,500
Maintenance and Emergency Reduction Benefits	= 4,900
	= $40,000

Maintenance or emergency restoration reduction benefits are not in prospect for the bulkhead replacement plan, because the new bulkhead would not be constructed until after the existing bulkhead fails (estimated to occur in 7 years.) Therefore, total average annual benefits attributable to the bulkhead replacement plan are limited to flood reduction and erosion reduction benefits:

Flood Reduction Benefits	= $13,600
Erosion Reduction Benefits	= $21,500
	$35,100

Since Reach B is adequately protected, no additional measures are provided for this reach. Benefits for protecting Reach C are described below.

Although Riverview Beach Park is located at the dike's downstream end, where according to the hydraulics analysis river changes offshore are diminished, there have been some river current changes at the upstream end of the park. Consequently, the feasibility of providing mitigation measures for the park was considered. The joint township-state park recreation plan calls for providing a fishing pier, picnic tables and benches, a man-made lake, basketball, tennis, volleyball and field hockey courts, open play areas; lavatories and a paved parking area. Part of the plan has already been constructed, and work on the remaining portion has been initiated. Because the existing and planned recreation facilities can experience short periods of inundation without significant damage, flooding damages to the park would essentially be limited to loss of recreation days during abnormally high tide stages and loss of some recreation land due to erosion.

As mentioned previously, a plan to provide stone revetment protection is the best alternative for the shoreline along the park. The stone revetment plan

would provide protection to the park for flood stages between +6.0 and +8.5 feet NGVD. The annual visitation to the park is estimated to be 174,000 initially with the improvements. The State recreationist says that additional growth is possible in the future; however, estimates of this growth are currently unavailable. An estimated value of $1.50 per visitor-day was obtained from procedures listed in ER 1105-2-300.

The computation of flood control benefits for the park is based on the difference in frequencies associated with flood stages of +6.0 and +8.5 feet NGVD, or 0.475. Assuming a two-day duration for floodwaters to recede and for cleanup, benefits for maintaining recreation usage are:

$$0.473 \times 174{,}000 \text{ visitor-days} \times \$1.50/\text{ vistor-day} \times \frac{2}{365} = \$676$$

It is estimated that 0.3 acres of land would be lost the first year because of failures of the wooden bulkhead and the embankment, and less than 0.1 acres would be lost each year thereafter due to erosion. Based on an estimated value for shoreline land of $10,000/acre, total annual erosion reduction benefits are equal to $900.

Total average annual benefits for protecting Riverview Beach Park:

Flood Reduction Benefits	= $ 676
Erosion Reduction Benefits	= 900
Total	$1,576
Rounded Total	$1,600

PROJECTED COSTS

It is noted that there are no real estate interests required for this project. That is because space is not available landward of the bulkhead for construction equipment and consequently as mentioned above the mitigation

measures must be constructed from the river side. In addition, access to the work area along the river will be by a 40 foot easement that is owned by the township. A copy of the Pennsville Township letter, furnishing that easement at no cost to the Federal Government, is included in Appendix C.

The estimated first costs for the selected protection plan for Reach A are shown in Tables 1 and 2, respectively.

TABLE 1

Estimated Cost - Rubble Toe Protection (5-foot top width)

Item	Quantity	Unit Price	Cost
Bedding Layer 1/	1,210 tons	$40,000 2/	$ 48,400
Armor Stone	2,380 tons	$40,000 2/	$ 95,200
		Subtotal	$143,600
	Contingencies @ 20%		28,720
		Subtotal	$172,320
	Engineering & Design @ 13%		22,400
	Supervision & Administration 9%		15,510
	Total Estimated First Cost		$210,230
	Rounded Total		$210,200

Average Annual costs for Interest and Amortization:

$210,200 x 0.0759 (CRF, 50 years) = 15,954

Estimated Costs for Operation and Maintenance = 12,000

Total Average Annual Costs $27,954

Rounded Total $28,000

1/ Excavation is not required because bedding material is placed on top of the existing beach.

2/ Bedding layer and armor stone prices include costs for mobilization and demobilization.

TABLE 2

Estimate Cost - Rubble Toe Protection (13-foot top width)

Item	Quantity	Unit Price	Cost
Bedding Layer	2,040 tons	$34.00	$ 69,360
Armor Stone	5,287 tons	$34.00	$179,800
		Subtotal	$249,160
	Contingency @ 20%		49,830
		Subtotal	$298,990
	Engineering & Design @ 13%		38,870
	Supervision & Administration @ 9%		26,910
	Total Estimated First Cost		$364,770
	Rounded total		364,800

Average Annual Costs for Interest and Amortization:

$364,800 x 0.0759 (CRF, 50 years)	=	27,688
Estimated Costs for Operation and Maintenance	=	500
Total Average Annual Costs		$28,168
Rounded Total		$28,200

TABLE 3

Estimated Cost - Bulkhead Replacement Plan

Item	Quantity	Unit Price	Cost
Remove Existing Bulkhead	Job	Lump Sum	$ 49,750
Z-27 Sheet Piling	39,000 SF	$14.40	$ 561,600
10 BP 42 Wale	1,300 LF	$18.50	$ 24,050
10 BP 42 H-Pile (Batter)	5,800 LF	$16.25	$ 94,250
Welded Stiffener and Plate	7,700 LBS	$ 1.00	$ 7,700
Welding (1/4" Butt)	1,160 LF	$ 9.70	$ 16,250
Backfill	1,200 CY	$10.25	$ 12,300
		Subtotal	$ 760,900
	Contingencies 20%		152,200
		Subtotal	$ 913,100
	Engineering and Design @ 16%		146,100
	Supervision and Administration @ 7%		63,100
	Total Estimated First Cost		$1,123,100
	Rounded Total		$1,123,000

Average Annual Costs for Interest and Amortization:

1,123,000 x 0.6.77 (PWF, 7 years)	= $682,447
682,447 x 0.0759 (CRF, 50 years)	= $ 51,798
Estimated Costs for Operation & Maintenance	= $ 1,100
Total Average Annual costs	= $ 52,898
Rounded Total	= $ 52,900

The estimated cost for the stone revetment plan for Riverview Beach Park are shown in Table 4.

TABLE 4

Estimated Cost - Riverview Beach Park

Item	Quantity	Unit Price	Cost
Remove Wooden Bulkhead	1,600 L.F.	$18.00	$ 28,800
Common Excavation	1,800 C.Y.	4.50	8,100
Backfill	500 C.Y.	2.50	1,250
Gravel Blanket	2,210 Tons	28.00	61,880
Stone Rip-Rap	4,325 Tons	34.00	147,050
		Subtotal	$247,080
Contingencies @ 20%			49,480
		Subtotal	$296,900
Engineering & Design @ 13%			38,600
Supervision & Administration @ 9%			26,720
Total Estimated First Cost			$362,220
Rounded total			$362,200

Average Annual Costs for Interest and Amortization:

362,200 x 0.0759	= $27,490
Estimated Costs for Operation and Maintenance	= $ 7,000
Total Average Annual Costs	= $34,490
Rounded Total	= $34,500

JUSTIFICATION

Comparison of the estimated benefits and costs show that the rubble-toe protection plans for reinforcing the steel bulkhead along Reach A are economically justified.

5 - Foot Top Width Section

$40,000	Average Annual Benefits
$28,000	Average Annual Costs
1.4	Benefit/Cost Ratio

13 - Foot Top Width Section

$40,000	Average Annual Benefits
$28,200	Average Annual Costs
1.4	Benefit/Cost Ratio

However, the bulkhead replacement alternative does not satisfy criteria for a Federal project. Comparison of benefits and costs show that bulkhead replacement would not be economically justified.

$35,100	Average Annual Benefits
$52,900	Average Annual Costs
0.7	Benefit/Cost Ratio

In addition conditions along the shoreline at Riverview Beach Park do not satisfy criteria for a Federal project.

Average Annual Benefits	$ 1,600
Average Annual Costs	$34,500
Benefit/Cost Ratio	0.1

CONCLUSIONS

The hydraulic analysis completed for this Abbreviated Detailed Project Study indicates that the dike's impact on erosion is limited to the shoreline landward of the dike.

Erosion damage directly attributed to the training dike, that is eligible for mitigation measures is limited to Reach A (400 feet upstream of Jenkins Avenue to Beach Avenue). The dike does have some effect on river current changes offshore from Beach Avenue to the downstream end of the dike. However, Reach B is adequately protected by a steel bulkhead and rubble-toe protection project jointly constructed by the township and the state. In addition, the Riverview Beach Park shoreline does not satisfy economic criteria for mitigation measures. Consequently, mitigation measures are not warranted for Reaches B or C. Since the hydraulic analysis indicated that the dike has not caused any increase in the rate of erosion for the entire shoreline located outside of the dike, mitigation measures are not warranted beyond the limits of the dike, see table 5.

In accordance with Section 111 authority, the cost of installing, operating and maintaining measures to mitigate erosion damages directly attributable to the dike (those in Reach A) are at 100 percent Federal expense with no local cooperation requirements.

The documents concerning the proposed mitigation project have been reviewed and evaluated, along with the stated views of interested agencies, by officials and concerned individuals on the alternative solutions to Pennsville's erosion problem.

Those alternatives have been studied from technical, environmental, social and economic standpoints in compliance with the Principles and Standards for

TABLE 5 - SUMMARY OF PRACTICABLE ALTERNATIVES

	Recommended Plan (NED and EQ Plan)	Alternative Toe Protection	Bulkhead Replacement Plan
A. PLAN DESCRIPTION	Rubble toe protection plan with 13-foot top width (wide enough to support a crane during construction)	Rubble toe protection sized to resist wave action. (5-foot top width)	Replacement of existing bulkhead in seven years with a steel bulkhead large enough to resist erosion forces, with no rubble toe protection.
B. SIGNIFICANT IMPACTS			
1. Economic	Total project first cost $365,000. Average annual charges $28,000. Average annual benefits $40,000 B/C Ratio 1.4	Total project first cost $210,000. Average annual cost $26,000. Average annual benefits $40,000. B/C Ratio 1.4	Total project first cost $1,125,000 Average annual cost $52,900 Average annual benefits $35,100 B/C Ratio 0.7
2. Environmental	Minor loss of river benthos. Some air and noise pollution and minor turbidity during construction. Increased diversity of aquatic habitat in submerged rock faces. Project will produce an overall positive impact.	Same	Incidental amount of turbidity would be generated. Impacts are considered minor and of short term.
3. Social Safety	Stabilization of bank erosion and floodign problems protecting property values and well being.	Same	Same, except that there will be a potential for flooding damages due to bulkhead failure during the first 7 years.
C. PLAN EVALUATION			
1. Contributes to planning objectives	Provides protection for the Pennsville shoreline and increases diversity of aquatic habitat.	Same	Provides protection for the Pennsville shoreline.

2. Relationship to four National Accounts

	Beneficial Effects	Adverse Effects	Beneficial Effects	Adverse Effects	Beneficial Effects	Adverse Effects
NED	Average annual benefit for erosion and flood damage reduction is $40,000	Total first cost of project is $365,000 annual charges of $28,200	Same	Total first cost of project is $210,000 with annual charges of $28,000	Average Annual benefit for erosion and flood damage reduction is $35,100	Total first cost of project is $1,123,000 with annual charges of $52,900
EQ	Fishery enhancement due to new habitat for fishes and aquatic invertebrates	Placement of revetment base will eliminate an area of river benthos. However, that area is only marginally productive.	Same	Same		Incidental amount turbidity
SWB	Stabilization of the shoreline and enhancement of aesthetic values		Same		Same	
RD	Increased property values and increased employment during construction.		Same		Same	

Planning Water and Related Land Resources. In evaluating the practicable alternatives, the following points were considered:

a. Environmental Considerations. The proposed mitigation plan is not a major action that significantly affects the qualities of the human environment. The project's adverse effects would be limited to noise and the disruption of traffic patterns by trucks moving supplies, and also by an incidental amount of turbidity generated in the river during construction. The relatively unproductive sandy beach habitat will be replaced by a more productive rocky shoreline habitat. Since the rubble-toe protection will increase the diversity of aquatic habitat, the project will have an overall positive environmental impact.

b. Social Well-being Considerations. The proposed rubble-toe protection would stabilize the shoreline and prevent eventual destruction of the steel bulkhead. This would protect the properties located behind the bulkhead from erosion and flooding damages.

c. Engineering Considerations. Of the alternatives considered, the selected plan (13-foot top width section) proved to be the most practical engineering solution in terms of both initial construction and subsequent maintenance. Therefore, it was selected over the smaller rubble toe protection plan (5-foot top width section) that is essentially equal when considered from an economics viewpoint.

d. Economic Considerations. The first construction costs for the recommended plan are greater than the costs for a small rubble-toe protection section that would satisfy engineering criteria for existing conditions. However, estimated maintenance costs are lower for the recommended plan. The net benefits are essentially equal for both rubble-toe protection plans.

The recommended plan is based on a thorough analysis and evaluation of all feasible alternative solutions. Adverse effects from this plan are small and could not be avoided by following any other feasible alternative course of action. Those adverse effects are ameliorated by the positive effect of the selected plan on the human environment, and therefore the public interest will best be served by implementing the recommended plan.

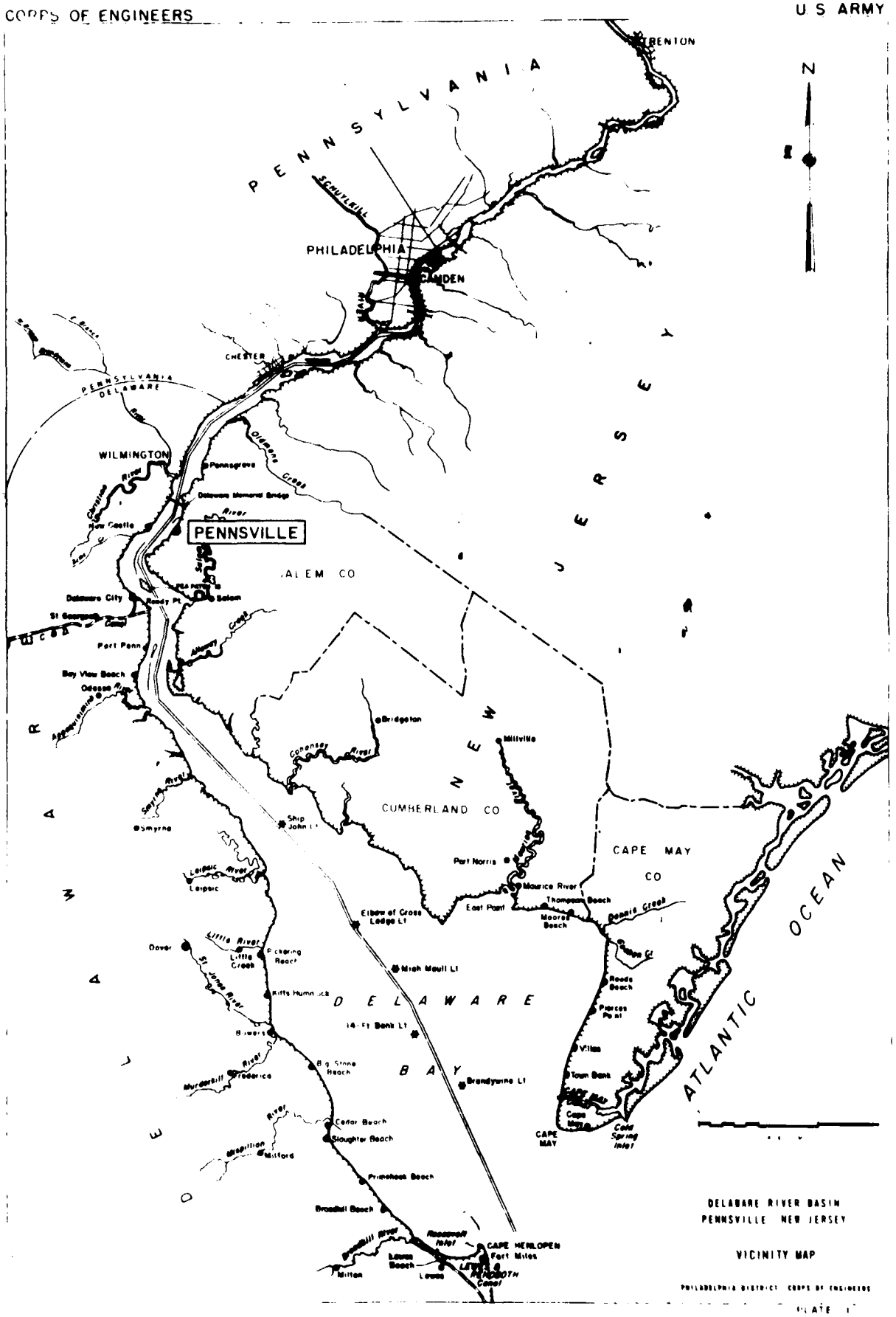
RECOMMENDATION

It is recommended that the rubble-toe protection project to mitigate erosion damages experienced along the Pennsville shoreline from 400 feet upstream of Jenkins Avenue to Beach Avenue defined herein as Reach A be approved in accordance with the selected plan described in this report. The total first cost of this improvement is currently estimated at $365,000, to be borne entirely by the Federal government.

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

CORPS OF ENGINEERS

U.S ARMY



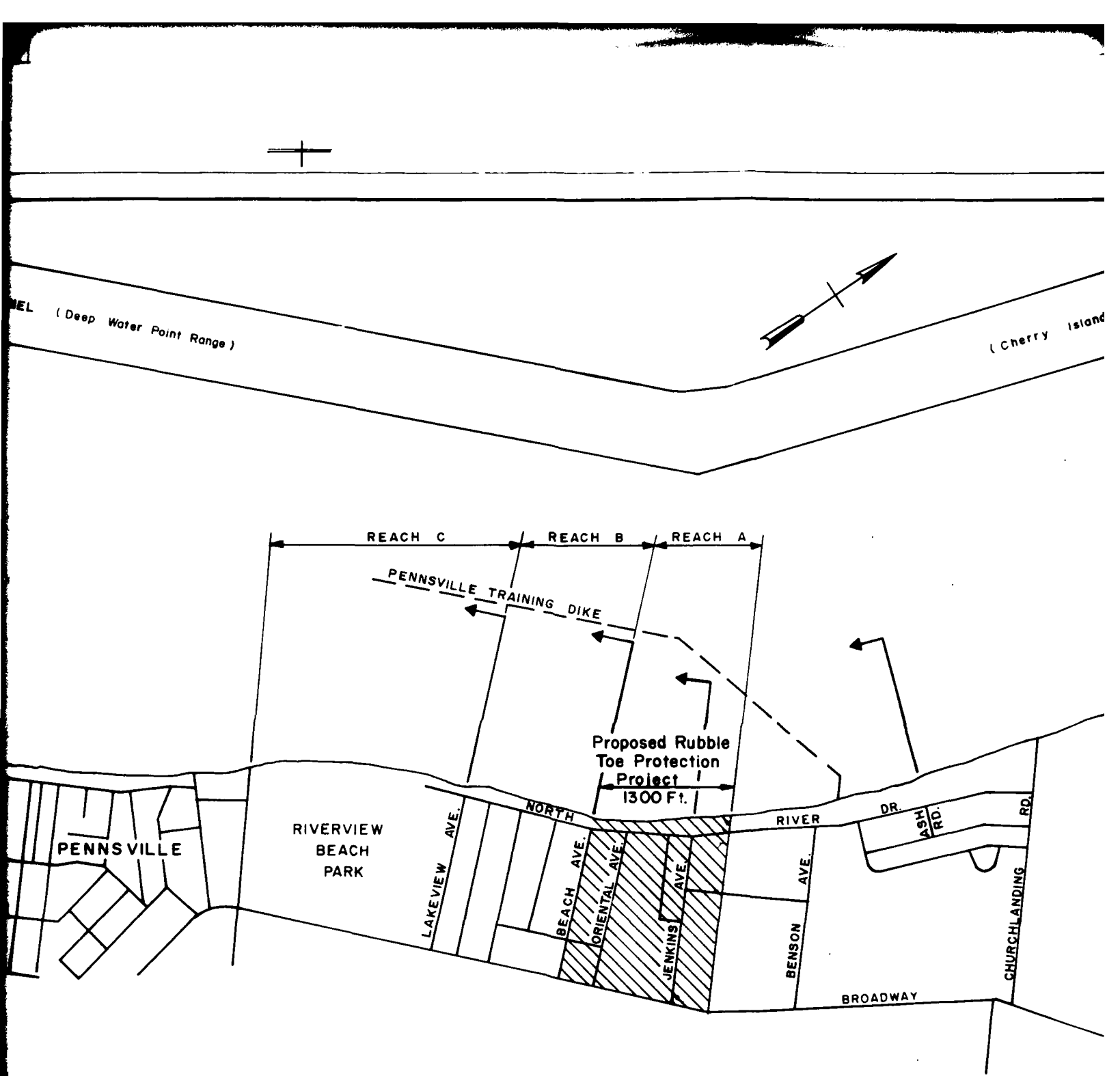
DELAWARE RIVER BASIN
PENNSVILLE NEW JERSEY

VICINITY MAP

PHILADELPHIA DISTRICT CORPS OF ENGINEERS

PLATE 1


DELAWARE RIVER NAVIGATION CHANNEL (De
MILES CREEK
TUFTS RD.
QUAKER RD.
HARVARD AVE.
PENN
BEACH
HIGHLAND AVE.
RIVIERA DR.

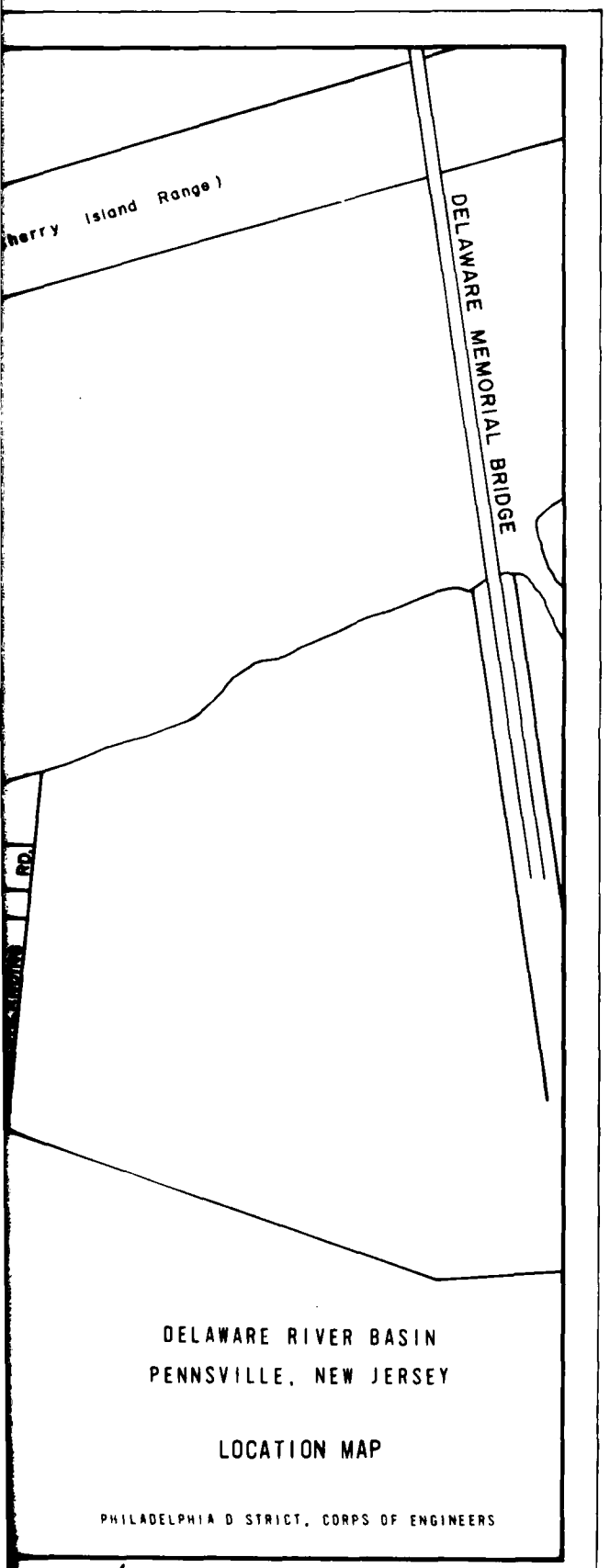


LEGEND

FLOOD DAMAGE AREA

CROSS-SECTION LOCATION

PHI

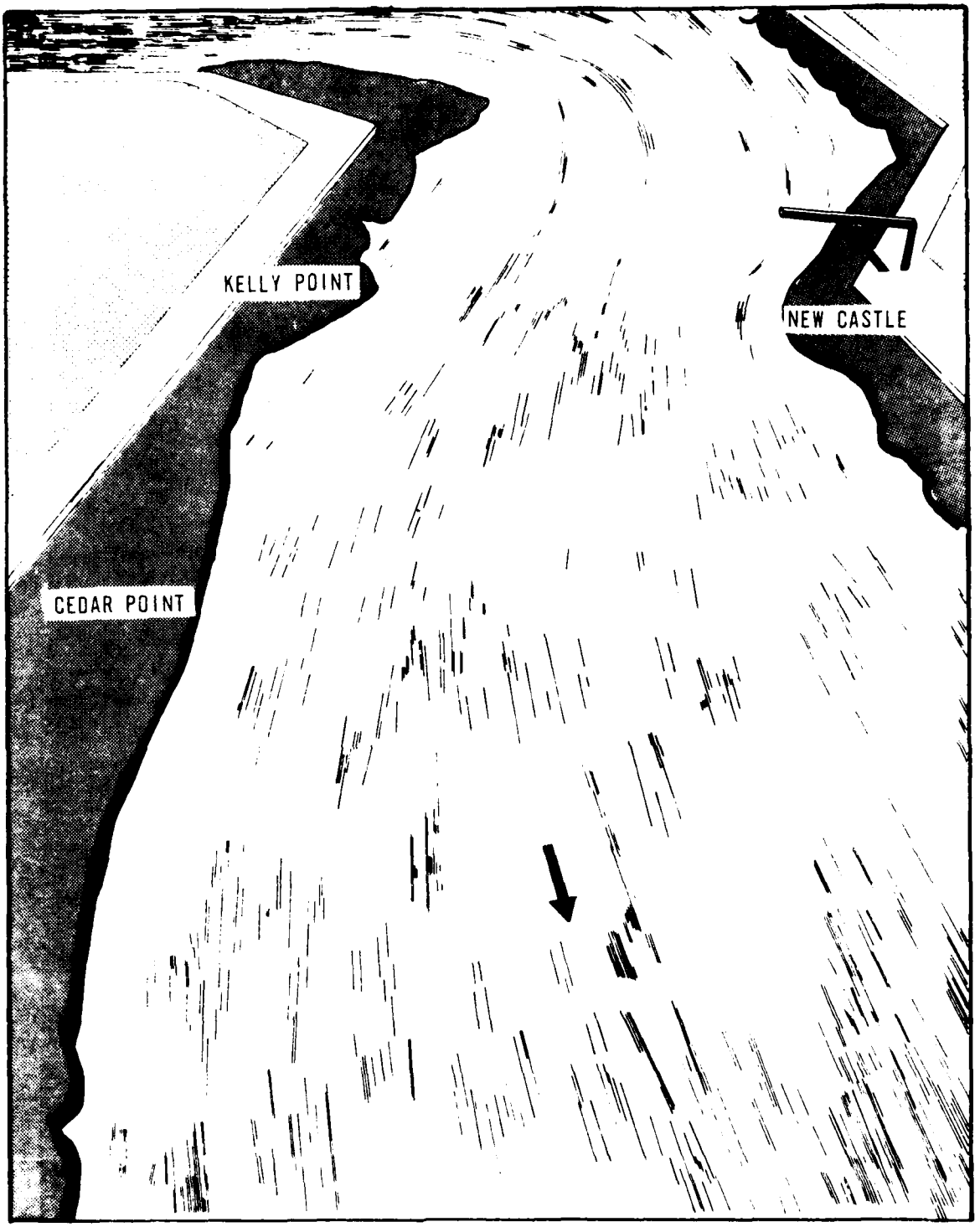


DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY

LOCATION MAP

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 2



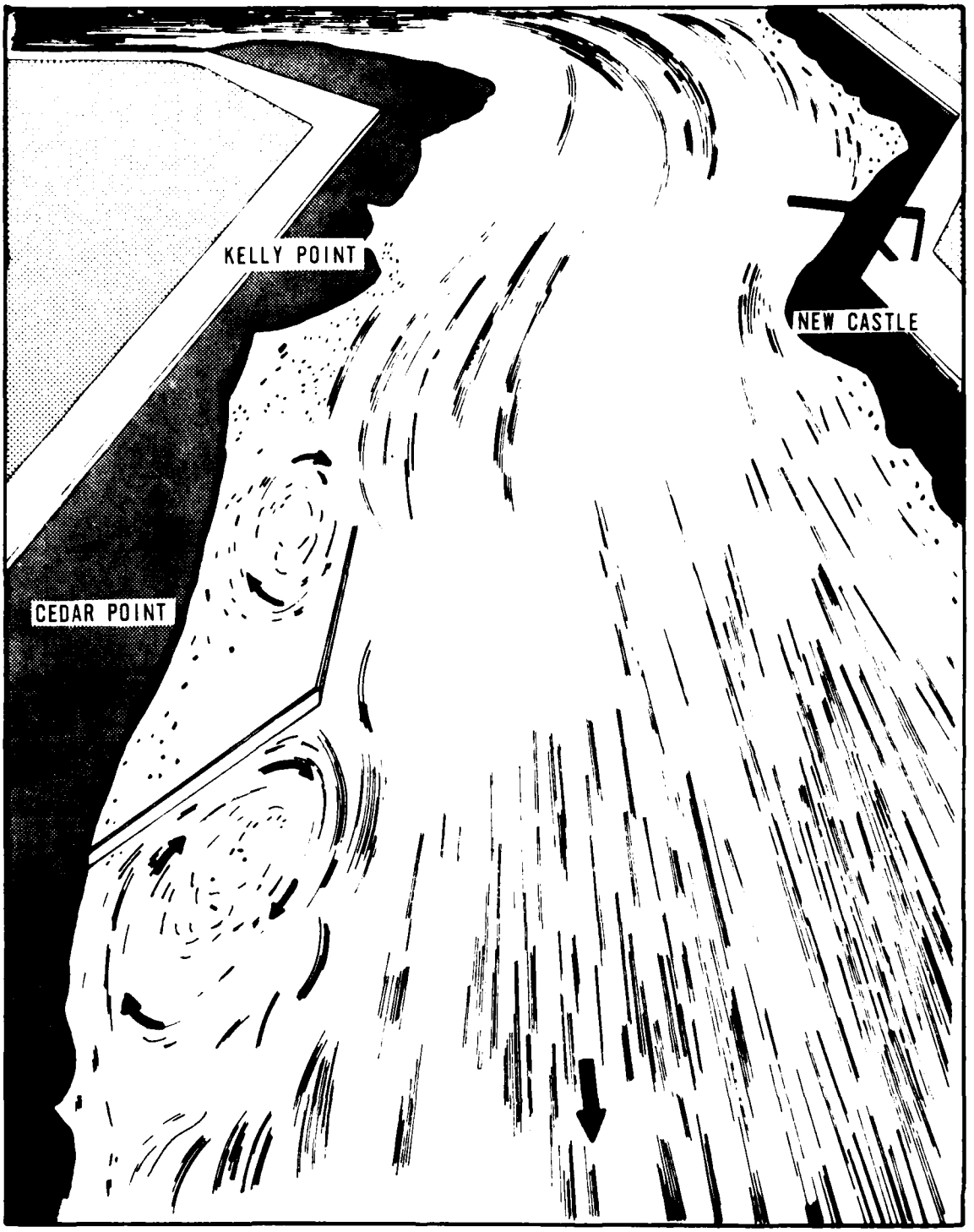
CONDITIONS: 1. 1941 MODEL TEST
2. WITHOUT DIKE

DELAWARE RIVER

PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENGTH OF FLOOD TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 3



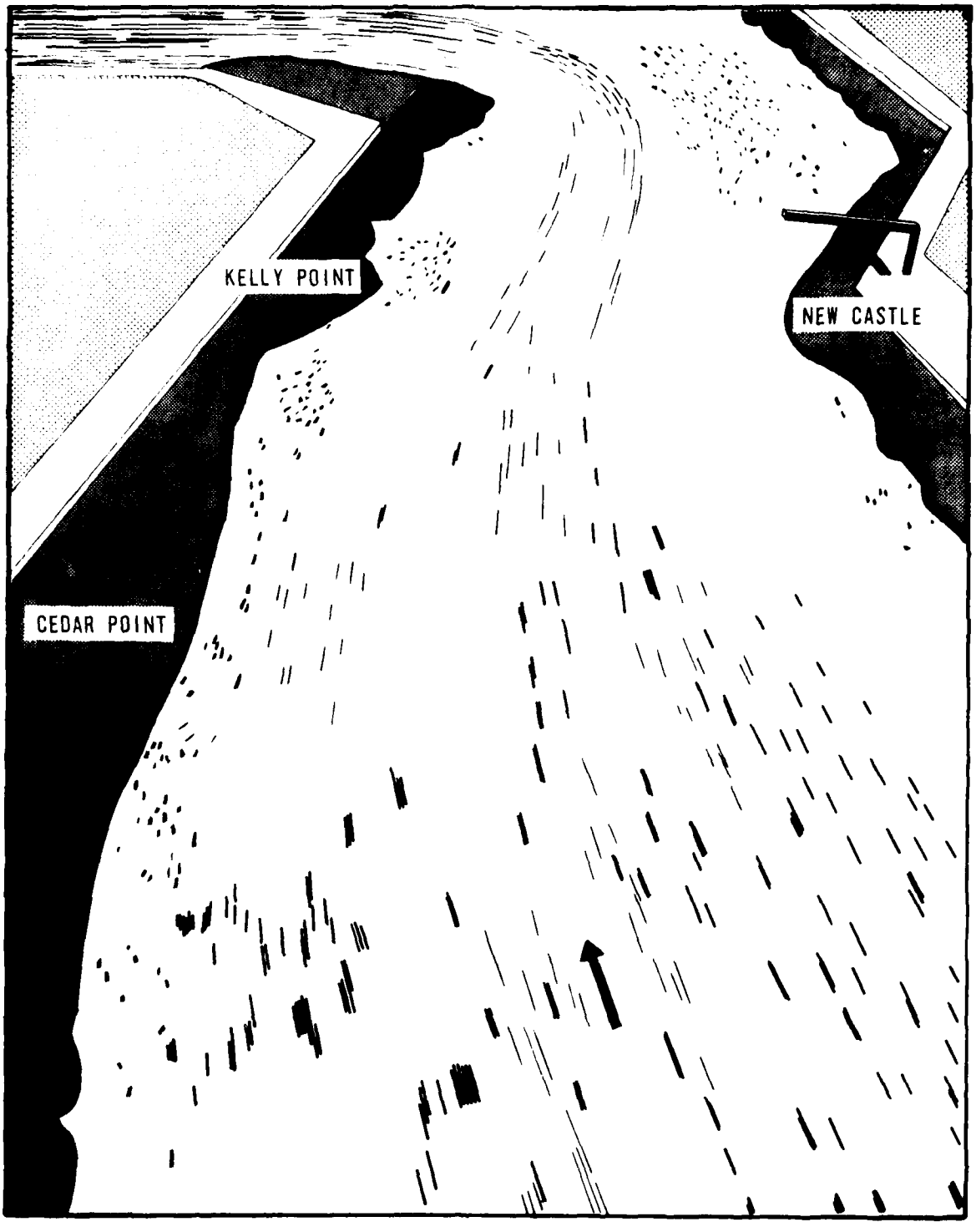
CONDITIONS: 1. 1941 MODEL TEST
2. WITH DIKE
3. TOP OF DIKE AT 5.1 FT. NGVD

DELAWARE RIVER

PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENGTH OF FLOOD TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 4



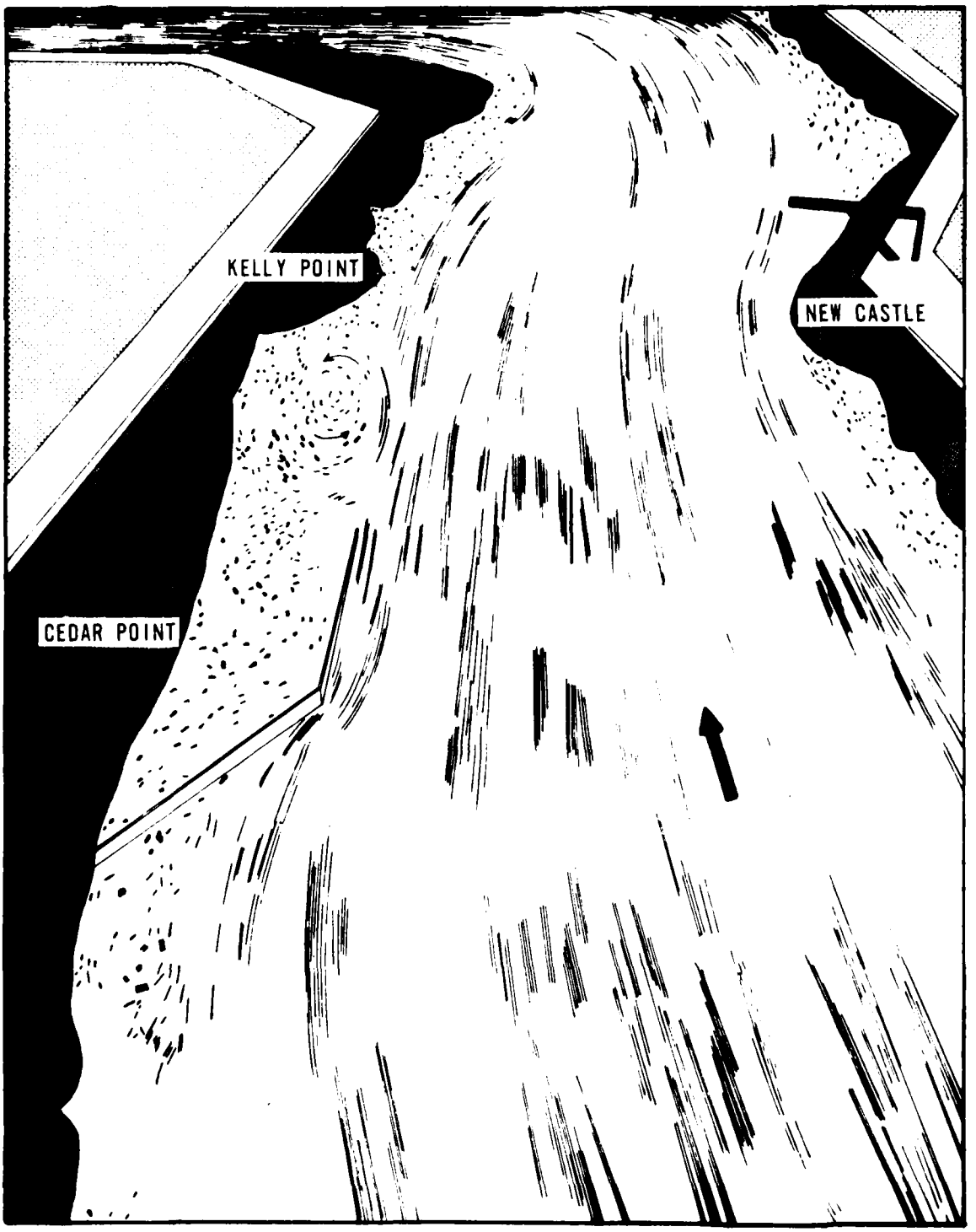
CONDITIONS: 1. 1941 MODEL TEST
2. WITHOUT DIKE

DELAWARE RIVER

PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENTH OF EBB TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 5



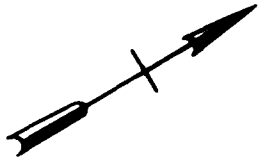
CONDITIONS: 1. 1941 MODEL TEST
2. WITH DIKE
3. TOP OF DIKE AT 5.1 FT. NGVD

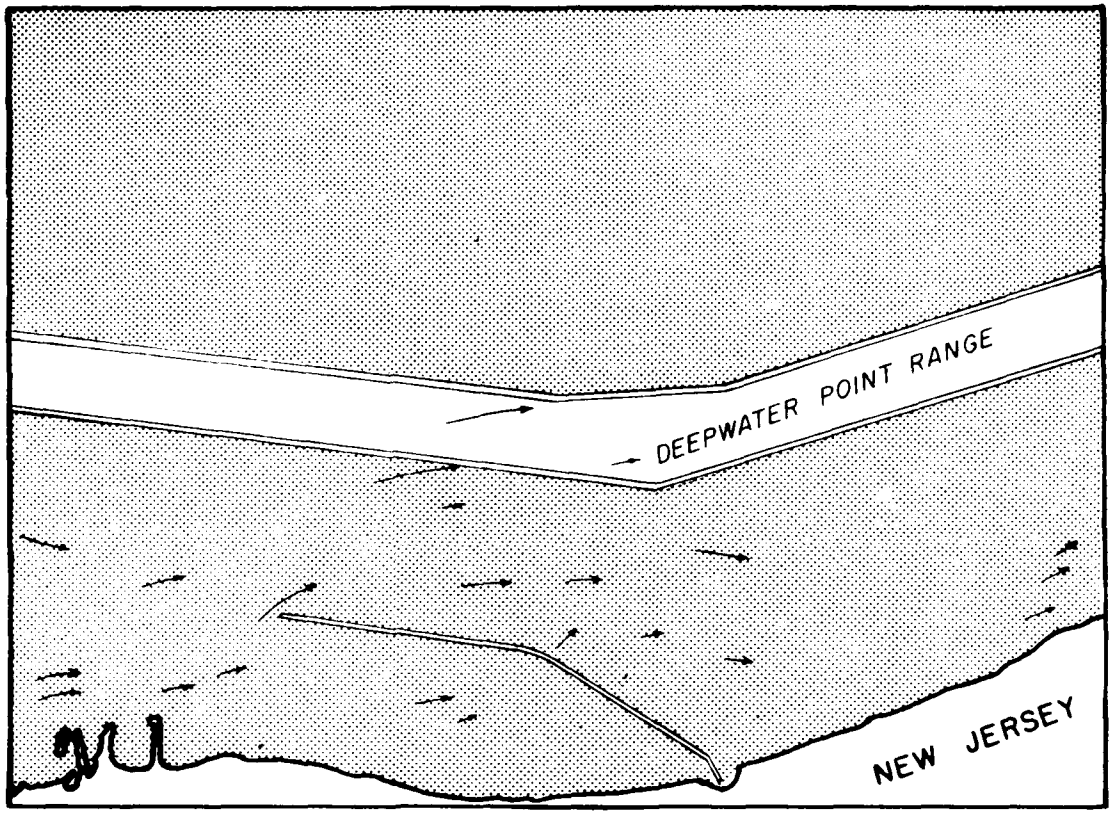
DELAWARE RIVER

PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENGTH OF EBB TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 6





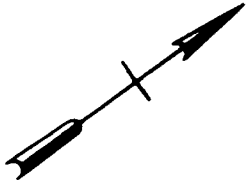
CONDITIONS: 1. 1963 MODEL STUDY
2. WITH DIKE
3 TOP OF DIKE AT 0.1 FT. NGVD

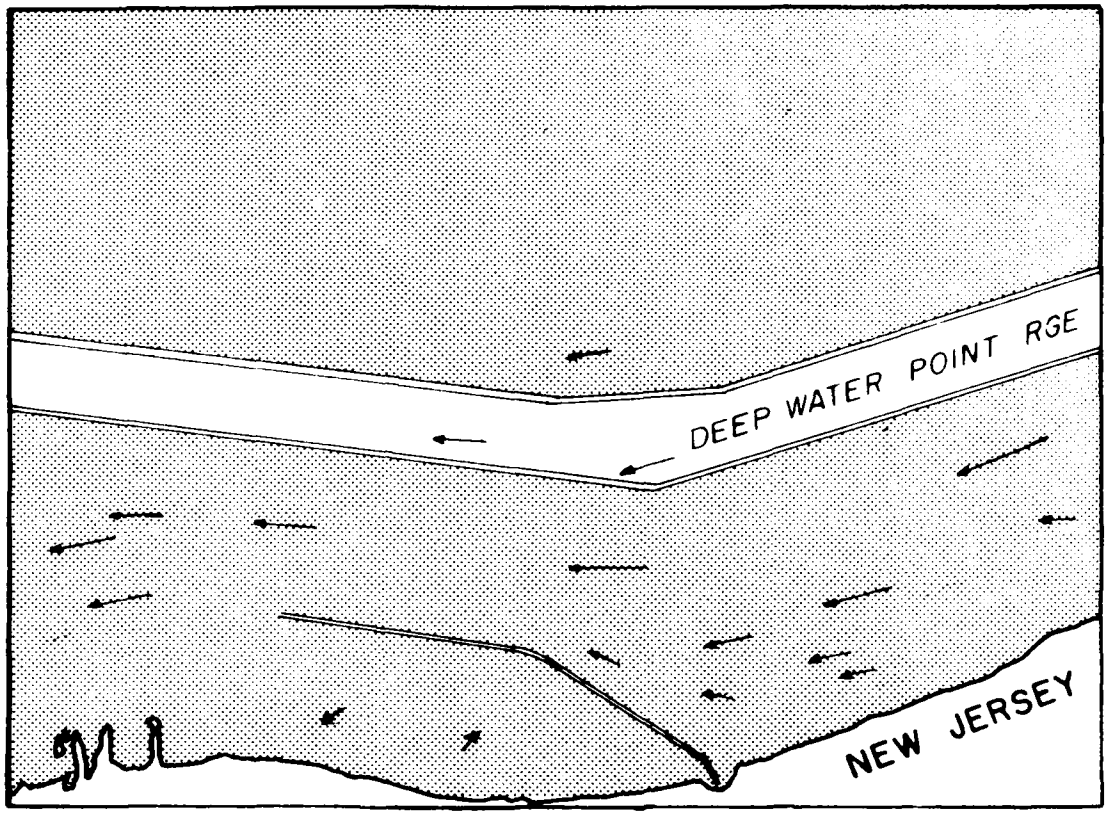
DELAWARE RIVER

PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENGTH OF FLOOD TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 7





CONDITIONS
1. 1963 MODEL TEST
2. WITH DIKE
3. TOP OF DIKE AT 0.1 FT. NGVD

DELAWARE RIVER
PENNSVILLE, NEW JERSEY
SURFACE CURRENT PATTERNS
(STRENGTH OF EBB TIDE)

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 8

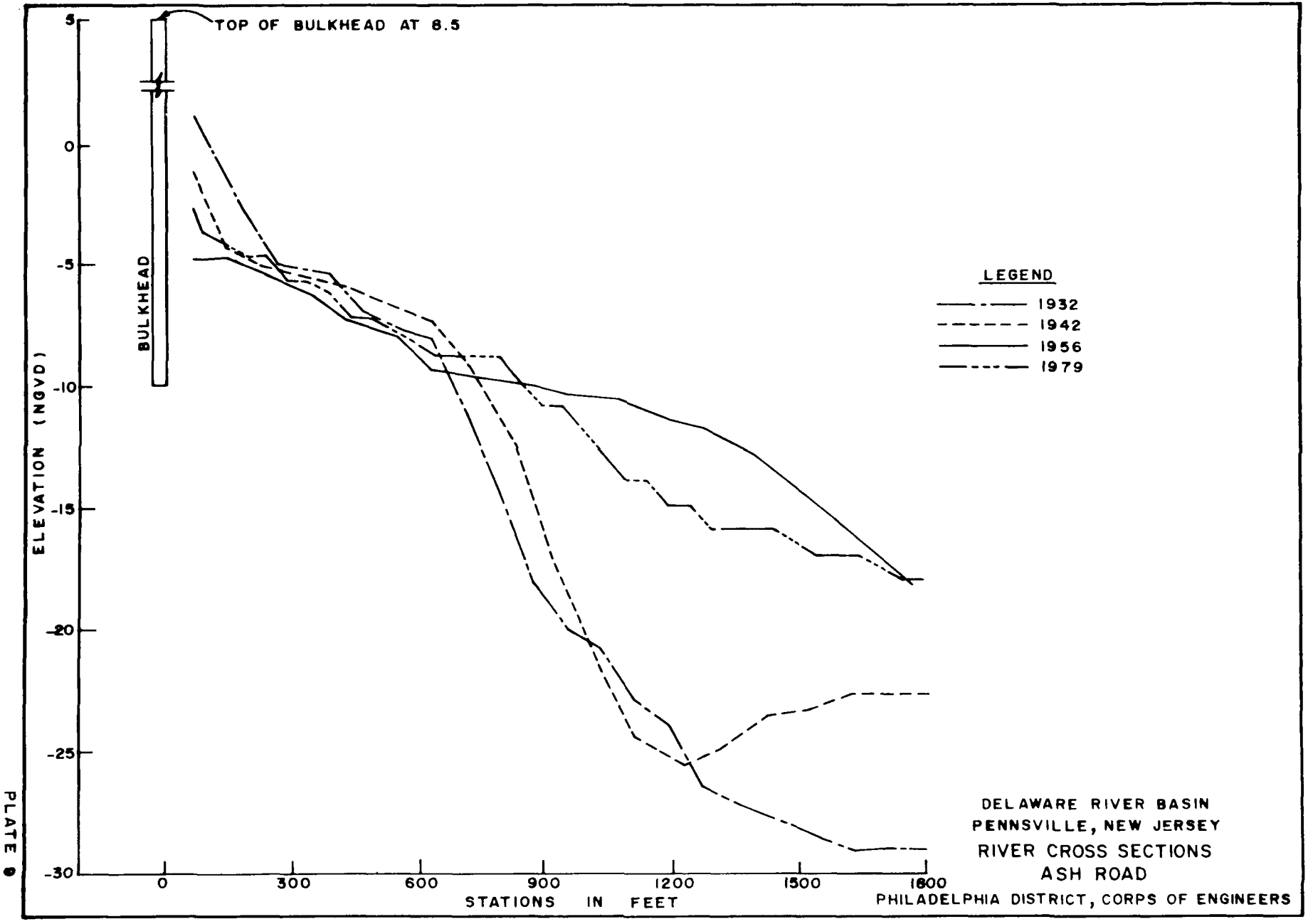
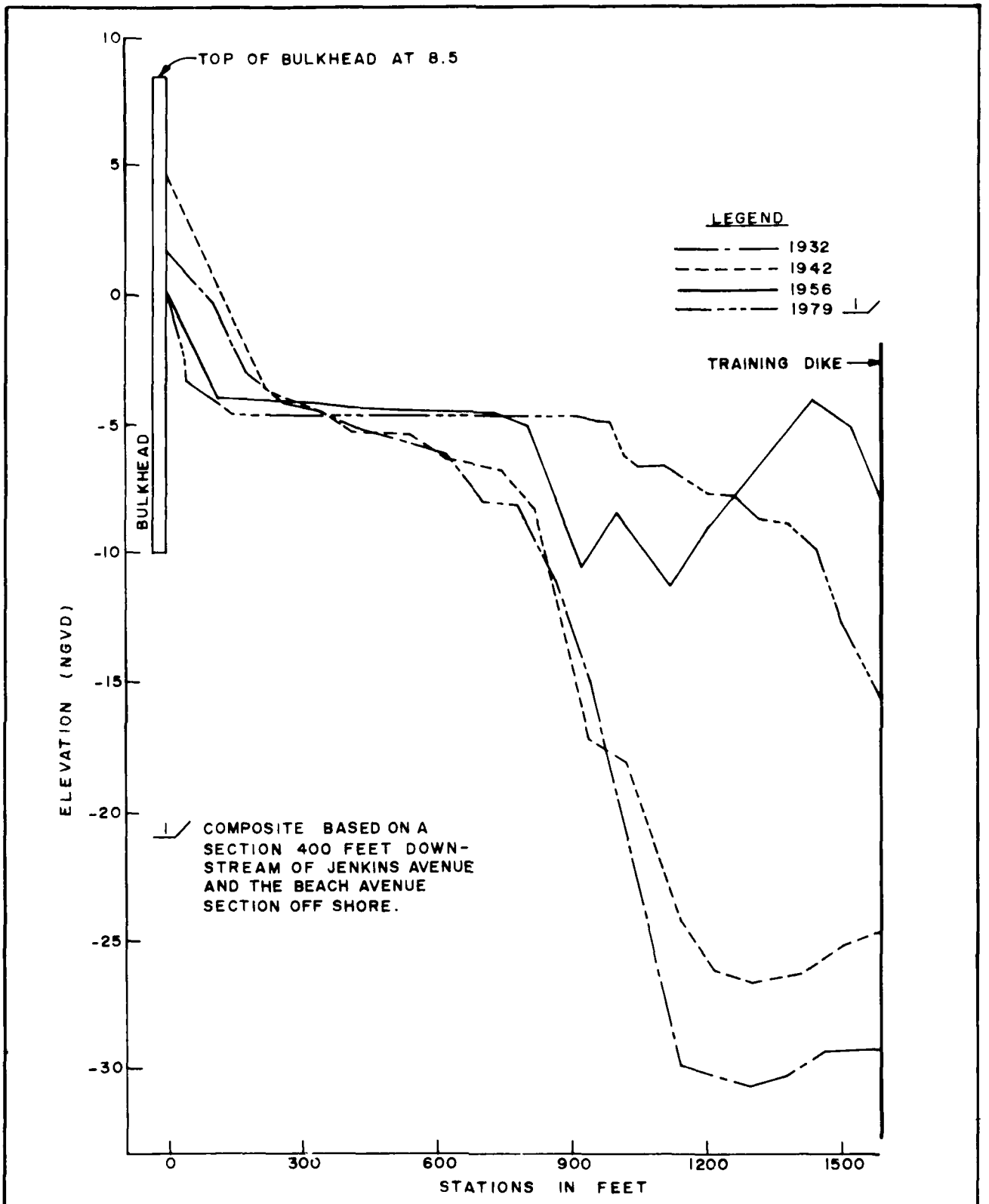
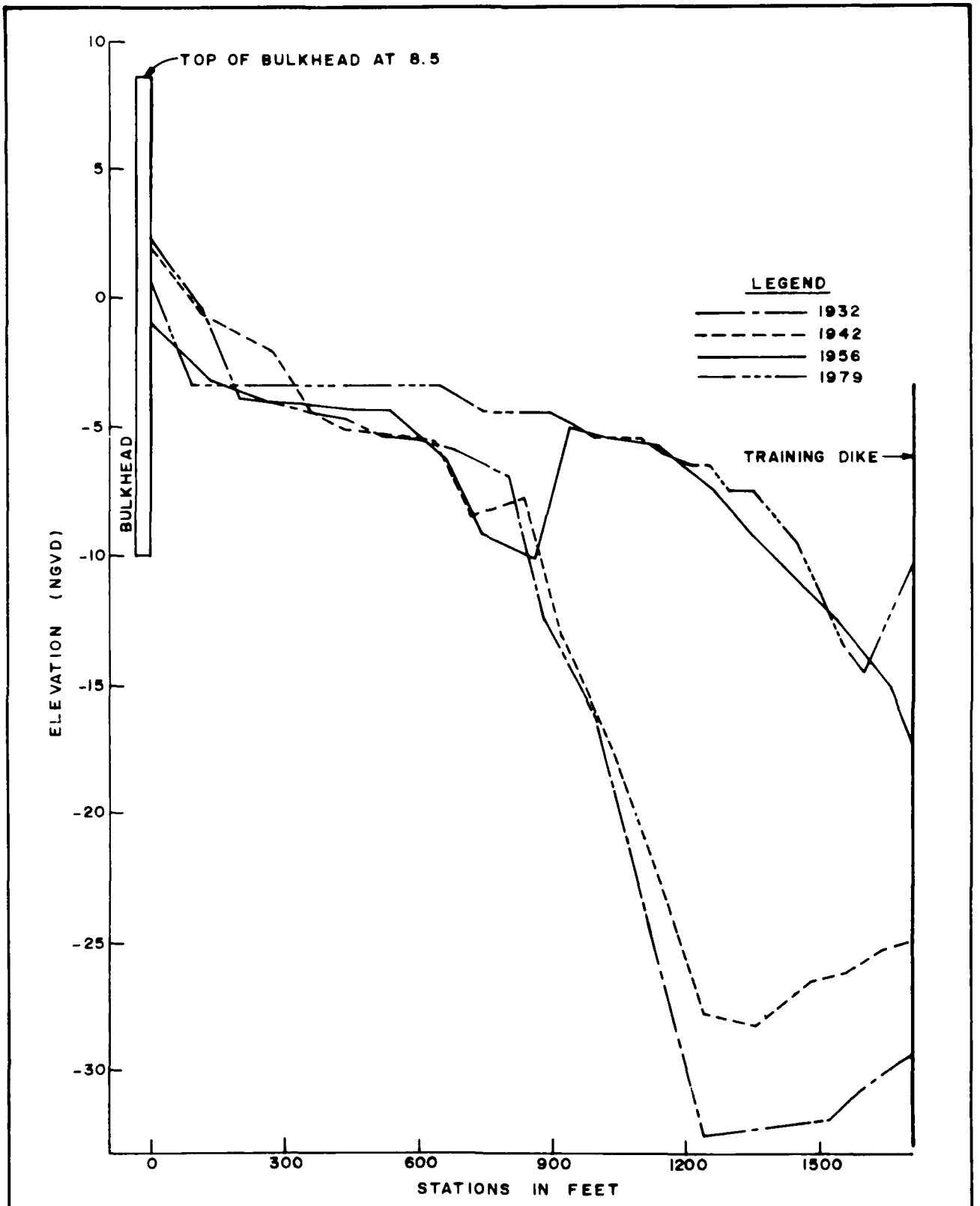

TOP OF BULKHEAD AT 8.5
BULKHEAD
ELEVATION (NGVD)
5
0
-5
-10
-15
-20
-25
-30
0
300
600
900
1200
1500
1600
STATIONS IN FEET
LEGEND
1932
1942
1956
1979
DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
RIVER CROSS SECTIONS
ASH ROAD
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 9



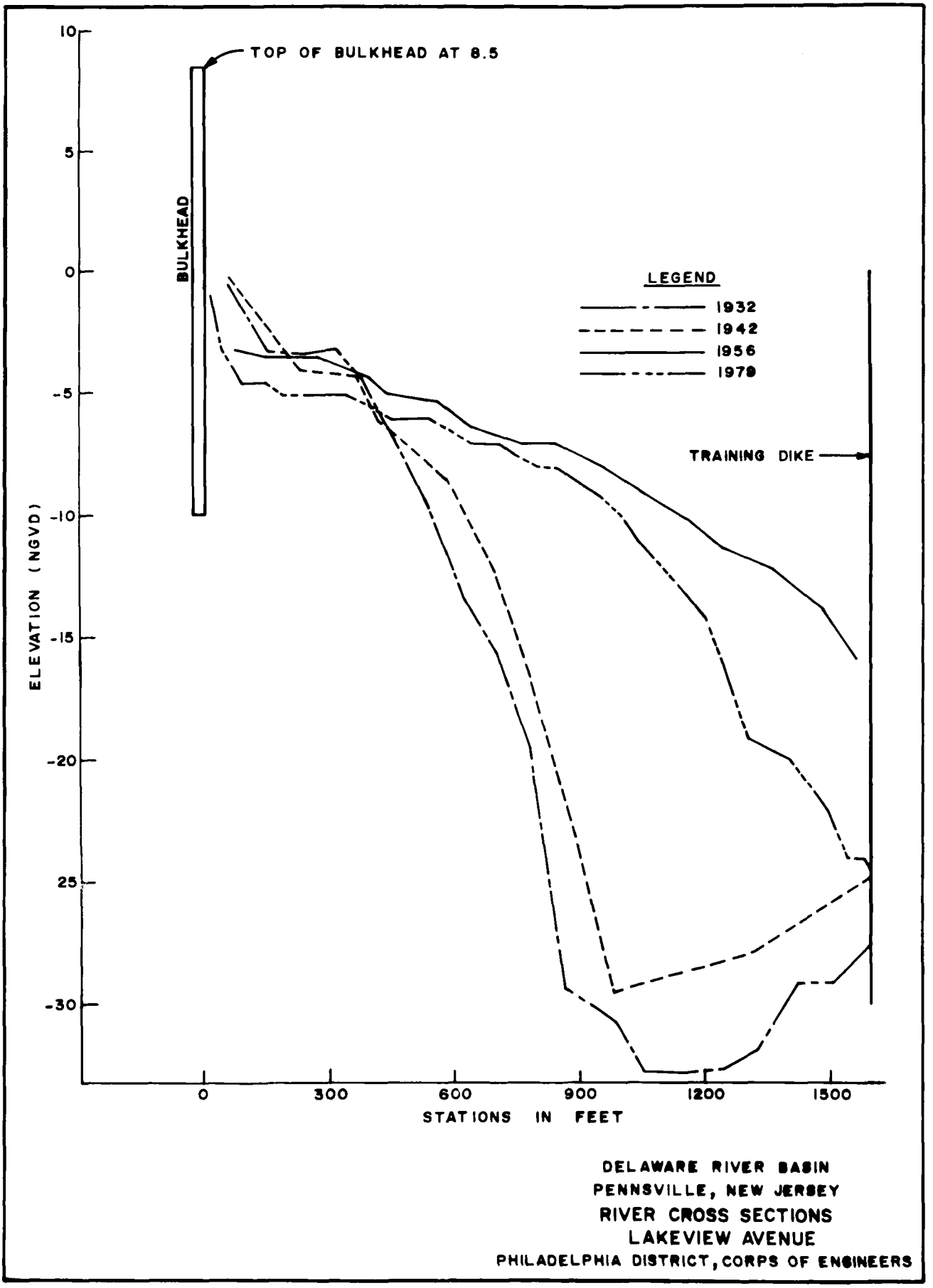
DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
RIVER CROSS SECTIONS
JENKINS AVENUE
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 10



DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
RIVER CROSS SECTIONS
BEACH AVENUE
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE II



DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
RIVER CROSS SECTIONS
LAKEVIEW AVENUE
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 12

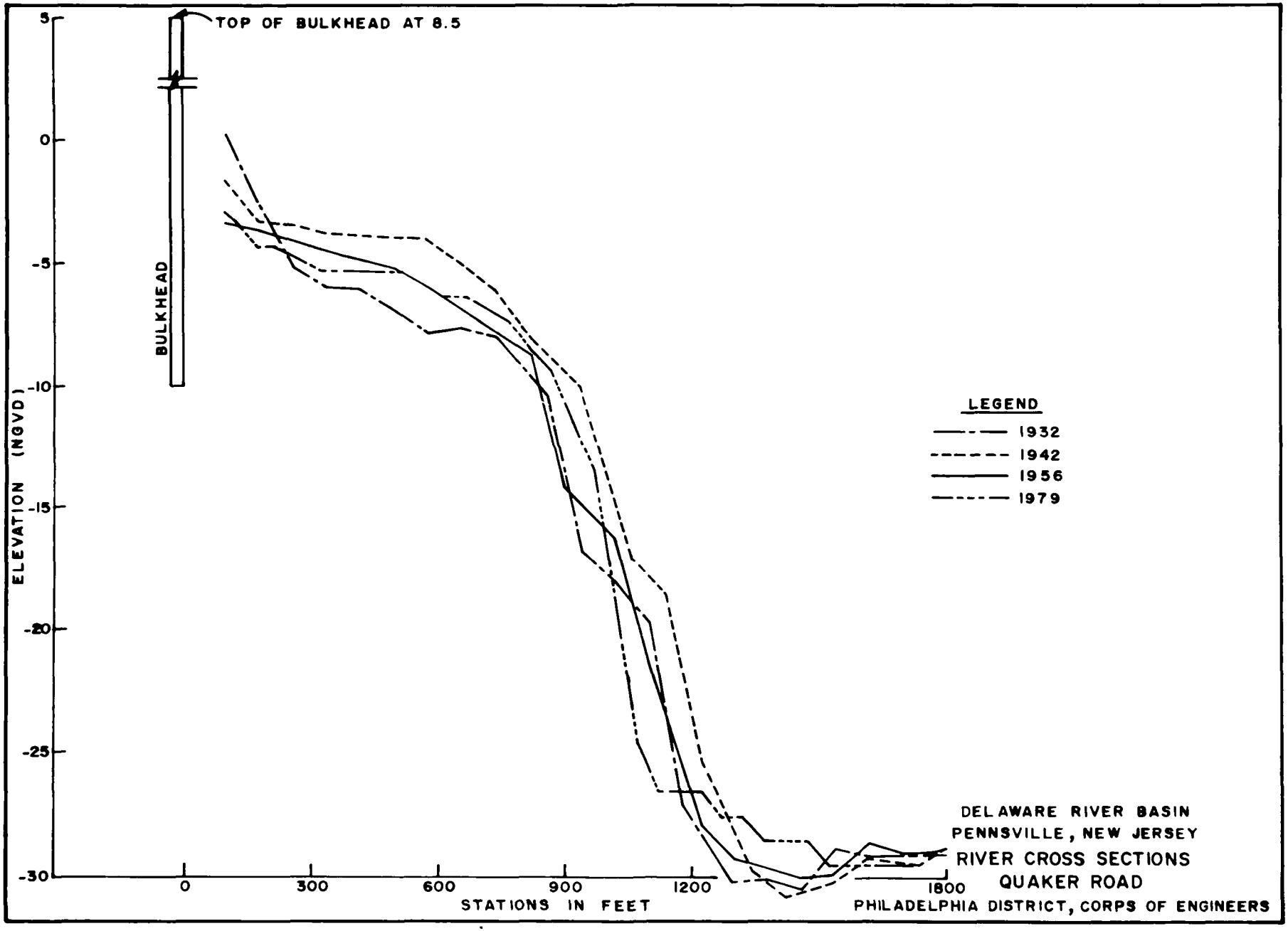
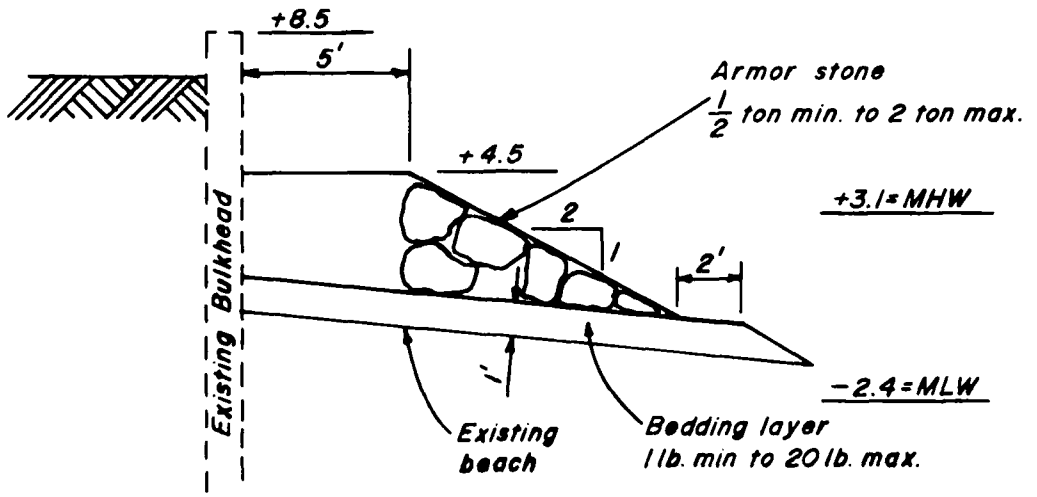
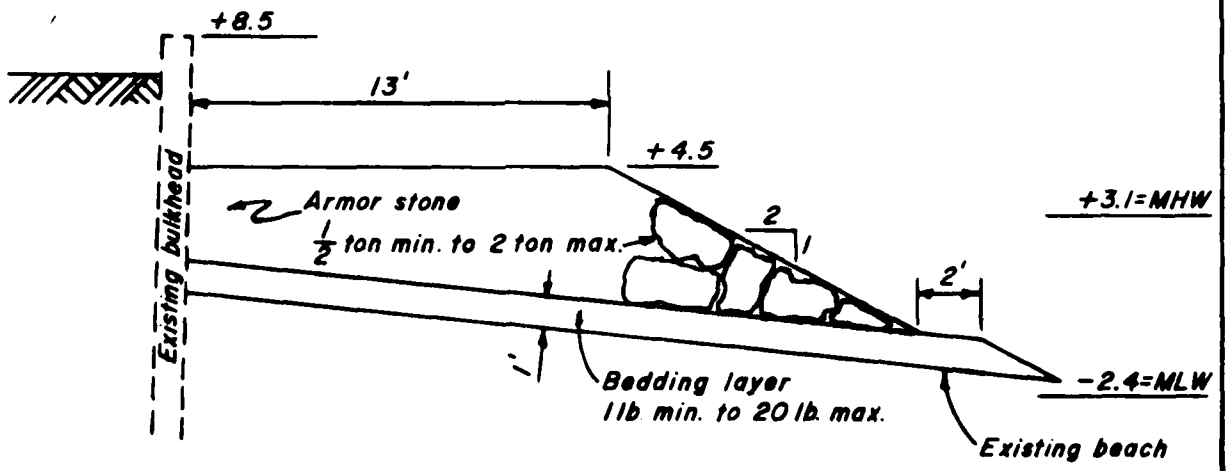

TOP OF BULKHEAD AT 8.5
BULKHEAD
5
0
-5
-10
-15
-20
-25
-30
ELEVATION (NGVD)
0
300
600
900
1200
1800
STATIONS IN FEET
LEGEND
1932
1942
1956
1979
DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
RIVER CROSS SECTIONS
QUAKER ROAD
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 13



TYPICAL SECTION-RUBBLE TOE PROTECTION

(5' TOP WIDTH)
N.T.S.



TYPICAL SECTION-RUBBLE TOE PROTECTION

(13' TOP WIDTH-SELECTED PLAN)
N.T.S.

NOTES

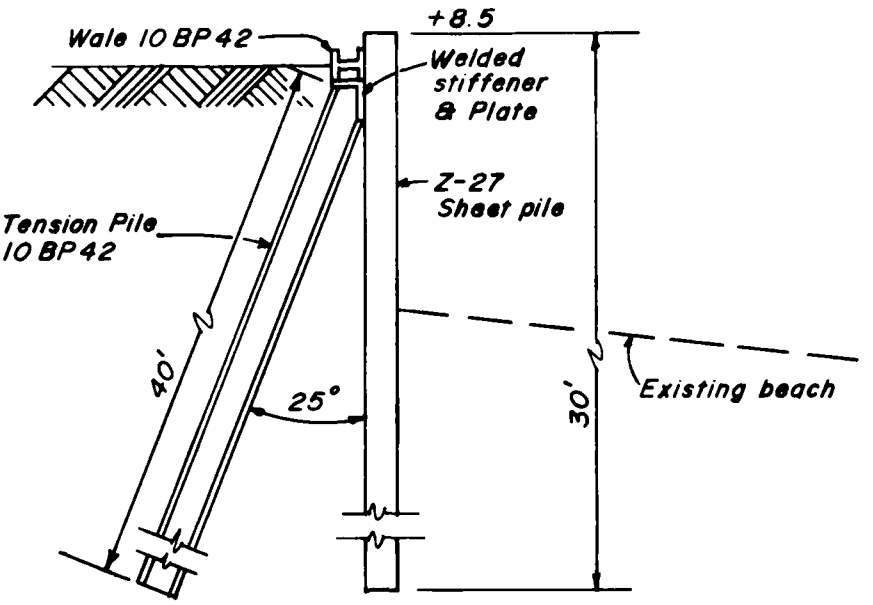
1. All elevations are in feet NGVD.
2. A 13-foot top width is the minimum size that can accommodate construction equipment operating on top of the section.
3. A 5-foot top width section is the minimum size that could satisfy current design criteria to resist wave action.

DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY

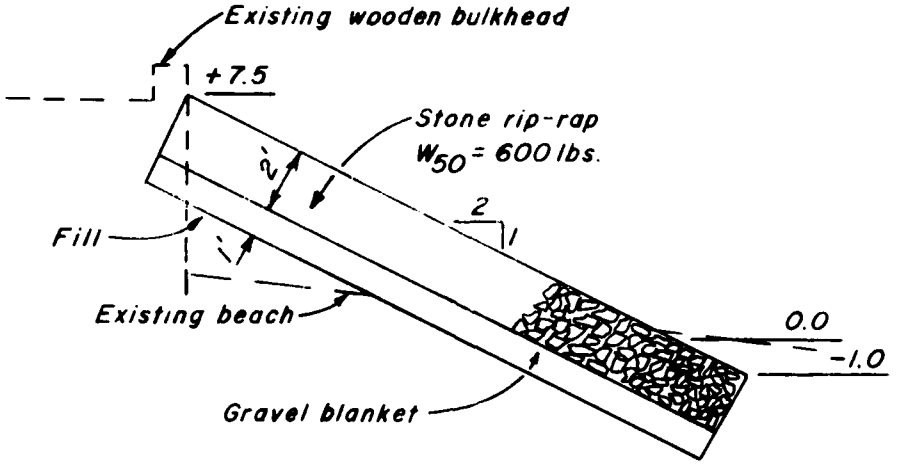
TYPICAL SECTIONS

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 14



TYPICAL SECTION - BULKHEAD REPLACEMENT
(N.T.S.)



RIVERVIEW BEACH PARK
TYPICAL SECTION - STONE REVETMENT
N.T.S.

NOTE:
All elevations are in feet NGVD

DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY

TYPICAL SECTIONS

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 15

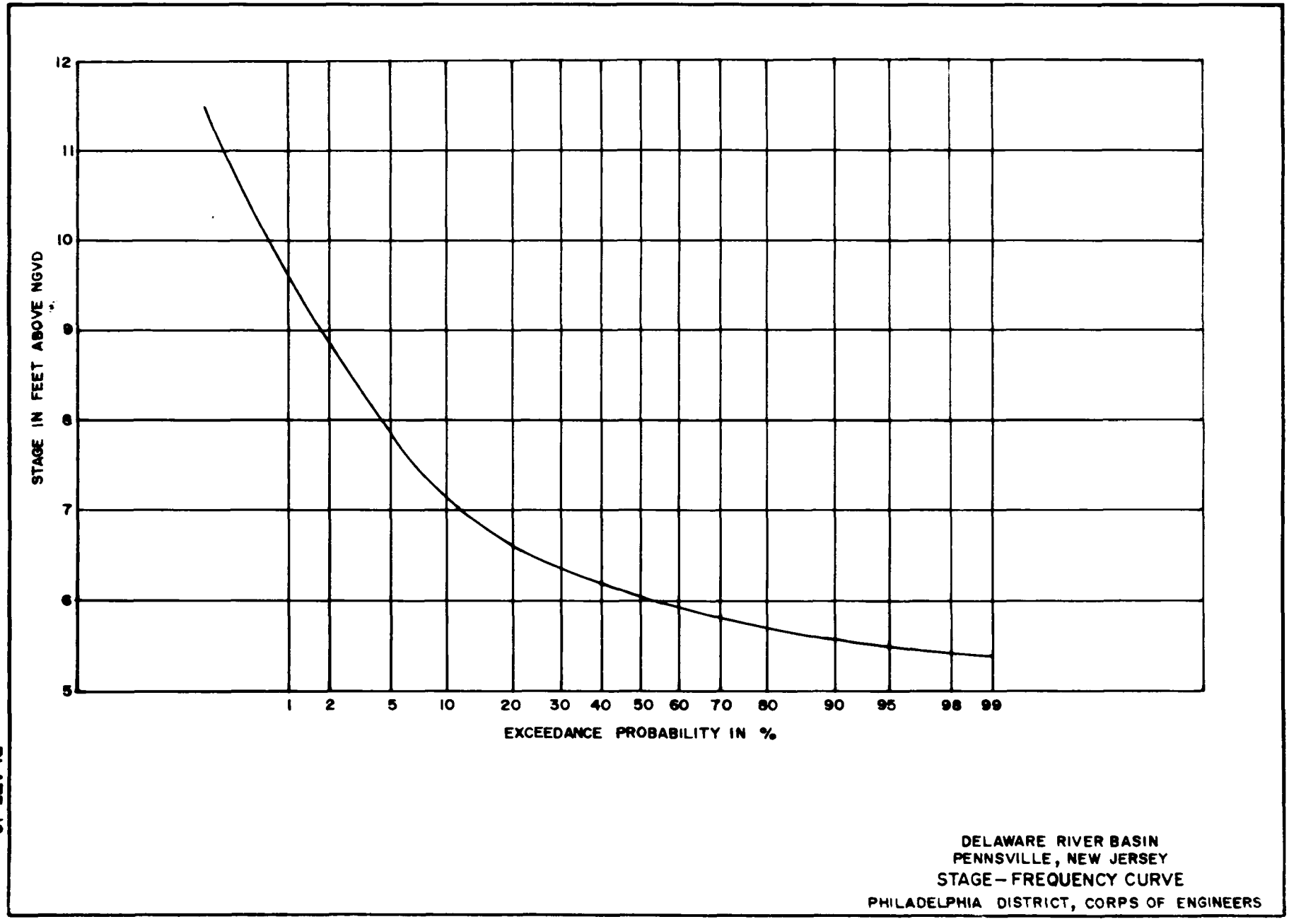


PLATE 16

DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
STAGE–FREQUENCY CURVE
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

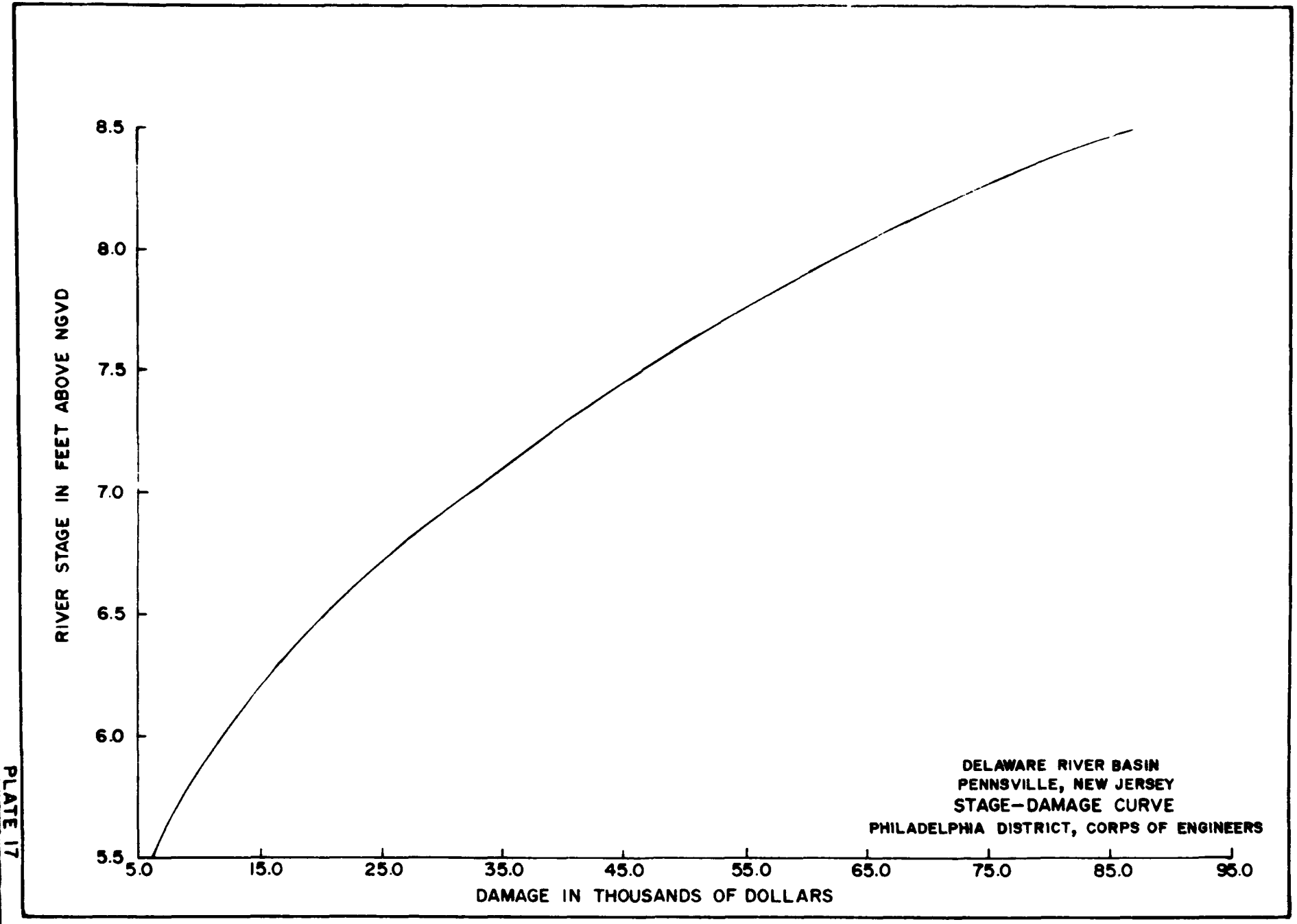

8.5
8.0
7.5
7.0
6.5
6.0
5.5
RIVER STAGE IN FEET ABOVE NGVD
5.0
15.0
25.0
35.0
45.0
55.0
65.0
75.0
85.0
95.0
DAMAGE IN THOUSANDS OF DOLLARS
DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY
STAGE–DAMAGE CURVE
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

PLATE 17

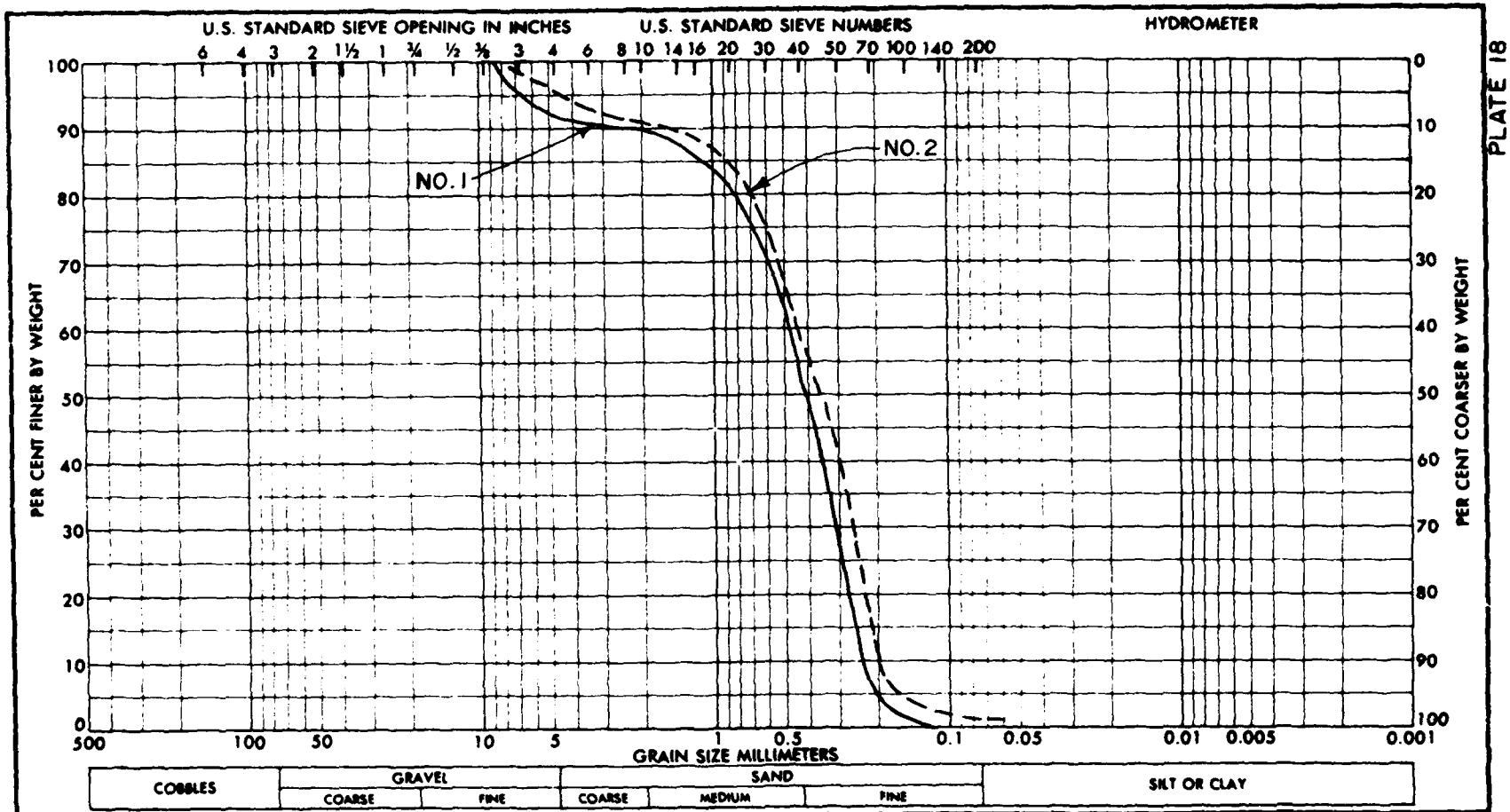


PLATE 18

SAMPLE NO	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
NO. 1	0–1.5'	BEACH SAND	——	——	——	——
NO. 2	0–1.5'	" "	——	——	——	——

GRADATION CURVES

PROJECT PENNSVILLE BULKHEAD PROTECTION

AREA 1300'STRETCH TO BE PROTECTED

BORING NO COMBINED SURFACE SAMPLING

DATE SAMPLES TAKEN: JUNE 13/79

U S GOVERNMENT PRINTING OFFICE 1963 OP—709-126

ENG FORM 2087
1 MAY 63

REPLACES WES FORM NO 1241, SEP 1962, WHICH IS OBSOLETE.

DELAWARE RIVER
PENNSVILLE, NEW JERSEY
MITIGATION OF EROSION DAMAGES

ABBREVIATED DETAILED PROJECT REPORT

FINDING OF NO SIGNIFICANT IMPACT

The Army Corps of Engineers proposed to reinforce the existing steel bulkhead at Pennsville, New Jersey. The proposed plan consists of constructing rubble-toe protection, which would have a 13-foot top width at elevation 4.5 NGVD and a face which would extend to the existing ground on a 2:1 slope.

Approximately 2,040 tons of bedding material and 5,290 tons of armor stone would be utilized in constructing the toe protection. Nearly three quarters of an acre of subtidal habitat would be modified along 1300 feet of shoreline. There are no real estate interests required for this project. Because space is not available landward of the existing bulkhead for construction equipment, this mitigation measure must be constructed from the river side. In addition, access to the work area along the river will be by a 40 foot easement owned by the township.

The Corps' biological assessment has determined that the proposed activity is not likely to jeopardize the continued existence of any species or the critical habitat of any fish, wildlife, or plant which is designated as endangered or threatened pursuant to the Endangered Species Act of 1973 as amended on 28 December 1979 by PL 96-159. Therefore, no formal consultation request has been made to the U.S. Department of the Interior, Fish and Wildlife Service.

APPENDIX A

DESIGN ANALYSIS

APPENDIX A

DESIGN ANALYSIS

TABLE OF CONTENTS

SECTION A-1

FOUNDATIONS EVALUATION

SITE GEOLOGY AND FOUNDATION CONDITIONS

The project site is located on the eroded shores adjacent to the Delaware River. The bluffs which are being eroded are of the Pleistocene Cape May Formation consisting predominantly of sands and gravels with occasional clayey lenses.

The protection works will be constructed on the firm shore foundation made of eroded and redeposited sands and gravels at the surface and underlain by more compact materials of the same formation. These materials are in contact with underlying very stiff deposits of retaceous age.

The foundation at the proposed site differs radically from that along the Pennsville dike where recent materials consisting of soft organic silt were deposited in the pre-existing Delaware River channel and attain a thickness of $\pm$ 100 feet.

Foundation conditions exploration consisted of a field investigation conducted during low tide conditions in the morning of June 13, 1979, when the shore width varied from 18 to 28 feet along the proposed reach of protection. Shore material was probed by pushing on the handle of a 3-foot-long-3/4 inch diameter metal pipe. The maximum penetration obtainable was 8 inches. Two samples considered representative of the clean yellow beach sand along the reach were taken, and their gradation curves are presented on Plate 18. Although cursory, this investigation is sufficient. The shore material will provide a fully adequate foundation for the proposed stone protection.

SECTION A-2

RUBBLE-TOE PROTECTION

RUBBLE-TOE PROTECTION

This is the best method of protecting the shoreline where the existing steel bulkhead is experiencing erosion damage. The design is in accordance with the provisions of the "Shore Protection Manual, 3rd Edition, 1977."

The design parameters for the steel bulkhead section are listed below:

Top elevation of existing steel bulkhead = +8.5 NGVD

Top elevation of rubble toe protection = +4.5 NGVD

Breaking wave height = 4.2'

B = Crest width of rubble toe protection

W = Minimum weight of single stone

Ns = Design stability number for toe protection

dl = Distance between top of toe protection & stillwater level

ds = Water depth at the structure

Ww = 64 #/FT^3, Sea water weight

Wr = 165 #/FT^3, Weight of stone

$Sr = \frac{Wr}{Ww} = \frac{165}{64} = 2.6$ (Specific gravity of rock)

θ = Angle of structure's slope

The evaluation to determine the Rubble Toe Protection design section is as follows:

$\frac{dl}{ds} = \frac{0}{6} = 0$

From Fig. 7-103 of reference, $N_s^3 = 8$

ARMOR STONE WEIGHT:

$$W = \frac{Wr \times H^3}{N_s^3 (Sr - 1)^3} = \frac{165 \times 4.2^3}{8\ (2.6 - 1)^3} = 373\#$$

Use 1/2 ton minimum to 2 ton maximum (To match existing, adjacent stone)

MAX. VELOCITY OF WATER THAT ARMOR STONE CAN RESIST:

$$V = \left[\frac{W \times 15.23 \times 10^5 \quad (Wr - Ww)^3\ (\text{Cos}\ \theta - \sin\theta)^3}{Wr\ Ww}\right]^{1/6}$$

$$V = \left[\frac{1000 \times 15.23 \times 10^5 \quad (165 - 64)^3 \quad (.89 - .45)^3}{165 \times 64}\right]^{1/6} = 48\ \text{FPS} > \text{Actual}$$

TOP WIDTH B:

$B = 0.4\ d_s = 0.4 \times 6' = 2.4'$

$B = 3 \times$ Ave. Dim. stone $= 3 \times 1.6 = \sim 5'$

Therefore a 5' top width section is the minimum size that could satisfy current design reave criteria.

However, due to the limited space available for construction between the bulkhead and river front homes, operating equipment on top of the rubble-toe protection is the only practicable method for constructing the project. That is also the only reliable method for maintaining the structure. A 13' top width section is the minimum size that will accommodate required construction equipment. The 13' top width is the selected design size for the rubble toe protection plan. That size also matches the crest width of existing stone rubble protection adjacent to this project. Typical rubble-toe protection sections are shown on Plate 14.

Estimated costs for the 5' and 13' top width sections are shown in Tables 1 and 2, respectively.

Estimated annual maintenance costs for the 5' and 13' sections are $12,000 and $500 respectively. Maintenance will be difficult for the 5' section because there is very limited access, and therefore the costs are high. The 13' section can easily be maintained and due to the large size of the structure, required maintenance will be infrequent. Consequently, estimated annual maintenance costs are minimal.

SECTION A-3

STEEL SHEETPILE BULKHEAD REPLACEMENT

STEEL SHEETPILE BULKHEAD REPLACEMENT

In Reach A, the existing bulkhead has failed at several locations due to a lack of erosion protection at the toe. An alternative to rubble-toe protection is complete replacement using a new, properly designed steel sheetpile bulkhead.

The preliminary design of the new bulkhead shown on Plate 15, was taken from another bulkhead actually constructed along the river under similar conditions. The sheetpiling is required to be 30' long in order to provide sufficient embedment to resist scouring at the toe. To prevent overstress and excess deflection, a tension pile was driven at 25o to the vertical. A horizontal tieback could not be utilized because of the excavation and disruption to the rear yards of the existing residences.

The estimated cost of the new steel sheetpile for Reach A (1,300 ft.) is shown in Table 3. The sheetpile length and tension pile requirements make this alternative more costly than rubble-toe protection. The estimated annual maintenance cost for this alternative is $1,100/year.

SECTION A-4

STONE REVETMENT (RIVERVIEW BEACH PARK)

STONE REVETMENT (RIVERVIEW BEACH PARK)

The original wooden bulkhead along the old Riverview Beach Amusement Park is beyond rehabilitation because of its age and the lack of maintenance. The bulkhead would be removed and the stone revetment constructed on a slope of 2H to 1V along the river bank to provide the erosion protection required. A berm is not required because access for construction equipment is available through the park.

Preliminary design of the stone revetment is based on a breaking wave height of 4 feet and a maximum elevation of +7.5 NGVD. Using the design procedures established in the Shore Protection Manual published by the Coastal Engineering Research Center, the required weight of the fifty percent size (W_{50}) is 600#. The maximum weight of the stone can be 2100# and the minimum weight can be 130#. A gravel blanket 1' thick is used to prevent wave action from washing out the fines through the stone riprap.

The cost of the stone revetment is shown in Table 4. The estimated annual maintenance cost for the revetment is $7,000/year.

APPENDIX B

ENVIRONMENTAL ASSESSMENT

NEED FOR THE PROPOSAL

STUDY AUTHORITY

Early studies of flooding and erosion conditions on the Delaware River coast in New Jersey suggested aggravation of those problems by a training dike in the river at Pennsville. Refer to Figure 1. The study of this situation was undertaken under the authority of Section 111 of the River and Harbor Act of 1968 (Public Law 90-483). That public law authorizes investigation and construction of projects to prevent or mitigate shore damages resulting from Federal navigation works.

PURPOSE AND NEED

Erosion along Pennsville shoreline developed into a major problem since completion in 1943 of the training dike for the Federal navigation project, Philadelphia-to-the-Sea. Bulkheads built during the period from 1956 through 1965 by the State of New Jersey were unable to halt that erosion. Emergency repairs and rehabilitation undertaken during the period from 1971 to date have reduced erosion inshore of the Pennsville training dike, to a reach in the vicinity of Jenkins and Beach Avenues and the shoreline along Riverview Beach Park.

A 1300-foot section of steel bulkhead in the vicinity of Jenkins and Beach Avenues continues to be undercut by eddy currents.

An 1800-foot section of wooden bulkhead facing Riverview Beach Park has deteriorated to the degree of nearly total loss of intended function.

ALTERNATIVES

Options available to correct the erosion problem at Pennsville caused by the training dike are limited. The fragmented remedial measures taken to date have confined the length of shoreline erosion to the present two segments.

BULKHEAD REPLACEMENT

Consideration of both steel and wooden bulkhead replacement with heavier and deeper steel bulkheading was analyzed and eliminated as excessively costly.

BREAKWATER

The addition of a supplemental breakwater was considered and eliminated for engineering and hydraulic reasons. A breakwater would be difficult to build and maintain due to poor foundation conditions offshore.

STONE REVETMENT

This option was considered as a replacement for the wooden bulkhead at Riverview Beach Park. However, existing conditions in this area do not satisfy criteria for a Federal project. Shore protection is being considered for inclusion in state and local plans for park rehabilitation and will likely be undertaken by them.

RUBBLE-TOE PROTECTION

This option, similar in nature to effective previous remedial actions, meets engineering design and cost requirements and provides realistic environmental enhancement of the fishery resources. This preferred alternative is intended to protect the toe of the existing steel bulkhead

from washing out while strengthening the bulkhead face to elevation +4.5 feet National Geodetic Vertical Datum (NGVD). About 1300 feet of bulkhead would be protected in this manner. It is anticipated that the work would require less than a year's time to complete, at a cost of approximately $365,000. About 7,000 tons of rock will be placed.

NO ACTION

The no action alternative will not rectify erosion problems caused in part by the Federal project. Without correction, the erosion problems will progress and threaten 23 residences upland of the bulkhead. Area flooding will continue with greater involved areas as more of the bulkhead is affected. Maintenance and repair costs of the bulkhead will increase.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

BULKHEAD REPLACEMENT

Work to replace both the wooden and steel bulkheads would be done from landward of the bulkheads. Detrimental impacts would include disruption of traffic patterns by movement of supplies by truck an the presence of cranes and excavations intruding on road rights-of-way. In addition, noise from pile drivers and other vehicles and air pollution from vehicles emissions would be greatly increased during the work. An incidental amount of turbidity would be generated in the river by this procedure. River bottom involved is small and is marginallly productive at best. Water quality in

the area is also marginal. 1/. Detrimental impacts are considered minor and of short-term. There is little opportunity for cultural resource involvement since the area has been previously worked. Energy resources will be used by vehicle consumption.

Beneficial impacts will include stabilization of bank erosion and flooding problems, thereby protecting property values, tax-ratables and social safety and well-being. These impacts are of a long-term nature.

RUBBLE-TOE PROTECTION

Rock placement will be from the water side of the bulkhead. Detrimental impacts will be similar to those listed for bulkhead replacement; however, they will be aggravated by the increase in traffic from continuous delivery of rock. Encroachment on rights-of-way will be less for this plan. Placement of the rubble-toe protection will eliminate a significant area of river benthos; however, that area is marginally productive. While of comparably short-term, the impacts of the work will be moderate.

Beneficial impacts of rubble-toe protection include fishery enhancement by establishing considerable new habitat in the submerged rock faces. The engineering purposes of the work will be achieved, thereby improving the quality of life in the community by elimination of erosion and flooding problems. Property values will be stabilized by these long-term impacts.

1/ Ref., Tyrowski, John M. - Shallows of the Delaware River, Trenton, NJ to Reedy Point, Del., COE, 1979.

NO ACTION

Adverse impacts of no action include continuation of erosion and flooding problems, becoming more extensive over time as additional portions of the bulkhead fail. That situation will result in the reduction of property values and disruption to community cohesion and safety.

While Federal funds will be temporarily saved, that would not be truly a benefit of no action. Additional costs would accrue through deterioration of in-site construction resulting in greater costs for corrective measures in the long-term.

CONSULTATION WITH OTHERS

The study was coordinated with Federal, state and local governments. Formulation for the proposed plan was closely coordinated with Pennsville Township officials. Refer to Appendix 2 of the report for coordination with Pennsville Township, the State of New Jersey and the U.S. Fish and Wildlife Service.

SECTION 404(b) (1) EVALUATION

MITIGATION OF EROSION DAMAGES AT PENNSVILLE, NEW JERSEY
SECTION 111

1. Project Description

a. Description of the proposed discharge of dredged or fill materials

(1) General characteristics of material	Natural stone
(2) Quantity of material proposed for discharge	7,000 tons
(3) Source of material	Quarry

b. Description of the proposed discharge site(s) for dredged or fill material

(1) Location and areal extent (include map)	Pennsville, NJ 1300-ft. of water front on Delaware River
(2) Type of discharge site(s)	Intertidal zone
(3) Method of discharge	Stone placement by crane
(4) When will discharge occur?	Undetermined
(5) Projected life of discharge site	Less than 3-month total

2. Physical Effects (40 CFR 230.4-1(a))

(a) Will wetlands be lost?	None involved
(b) What will be the effects of the water column as to:	

(1) light transmission	Slight turbidity during placement
(2) aesthetic values	Similar to existing conditions
(3) direct effects on	
(a) Nekton	
(b) Plankton	
(c) What will be the significance in covering the benthos as to:	
(1) relative extent of loss	Minimal of marginal quality
(2) time required for repopulation	New population starting immediately
(3) change in benthic community	To rock shelter habitat
(4) affect on other species which are dependent upon the benthos	N/A
(d) What will be the change in:	
(1) bottom geometry	Shallow intertidal flat muds to inclined rock face
(2) substrate composition	Muds, clay
(3) salinity gradients	Near salt line in river
(4) aleration of biological communities due to exchange of constituents between sediments and overlying water?	None
3. Chemical - Biological Interactive Effects (40 CFR 230.4-1(b))	
a. Does the material meet the exclusion criteria? (If so, state the rationale.)	Yes, natural stone, inert

4. Description of site comparison (40 CFR 230.4-1 (c))	
a. Total sediment analysis (40 CFR 230.4-1(c)(1))	
b. Biological community structure analysis (40 CFR 230.4-1(c)(2))	Shallows Study & USFW Report
5. Review Applicable Water Quality Standards	
a. Compare constituent concentrations	Ibid
b. Consider mixing zone	Ibid
c. Based on a and b above will disposal operation be compatible with applicable standards?	Yes
6. Selection of Discharge Sites (40 CFR 230.5) for Dredged or Fill Material	
a. Need for the proposed activity	Control erosion and community flooding
b. Alternative sites and methods of discharge considered	No alternative sites or discharge methods
c. Objectives to be considered in discharge determination (40 CFR 230.5(a))	
(1) Impacts on chemical, physical and biological integrity of aquatic ecosystem (40 CFR 230.5 (a)(1))	Short-term local turbidity
(2) Impact on food chain	Improved habitat
(3) Impact on diversity of plant and animal species	New species habitat
(4) Impact on movement into and out of feeding, spawning, breeding and nursery areas	None

(5) Impact on wetland areas having significant functions of water quality maintenance	None
(6) Impact on areas that serve to retain natural high waters or flood waters	None
(7) Methods to minimize turbidity	None required. Short-term and minimal turbidity
(8) Methods to minimize degradation of aesthetic, recreational, and economic values	Values not impacts
(9) Threatened and endangered species	None
(10) Investigate other measures that avoid degradation of aesthetic, recreational, and economic values of navigable waters	N/A
(d) Impacts on water uses at proposed discharge site (40 CFR 230.5 (b) (1-10)	
(1) Municipal water supply intakes	None
(2) Shellfish	None
(3) Fisheries	None
(4) Wildlife	None
(5) Recreation Service	None
(6) Threatened and endangered species	None
(7) Benthic life	Minimal of marginal quality
(8) Wetlands	None

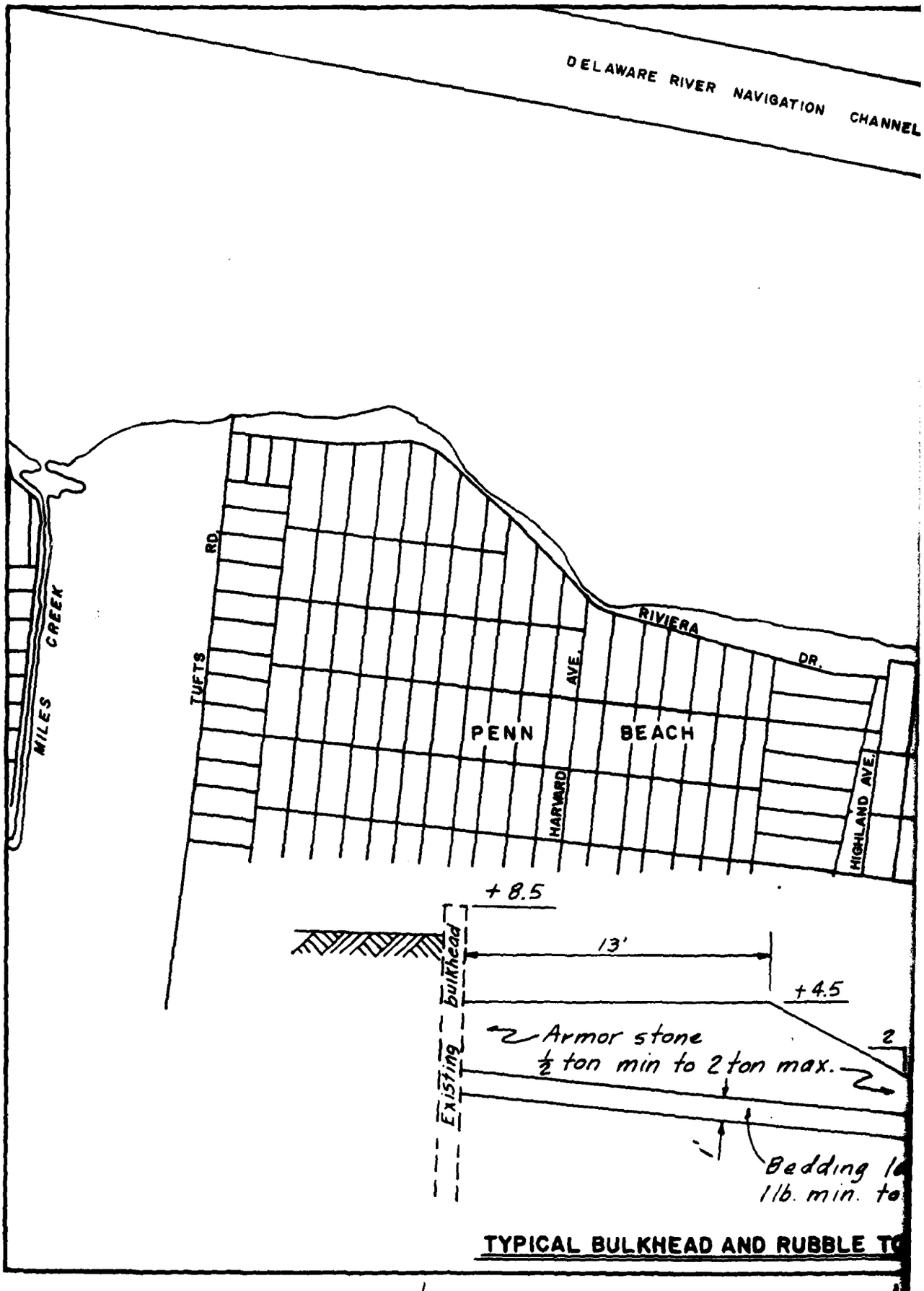
(9) Submerged vegetation	None
(10) Size of disposal site	1300-feet X 25-feet ±
(e) Considerations to minimize harmful effects (40 CFR 230.5 (c) (1-7))	
(1) Water quality criteria	Crane placement of rock
7. Statement as to contamination of fill material if from a land source (40 CFR 230.5(d))	Natural rock, inert

8. Conclusions and determinations

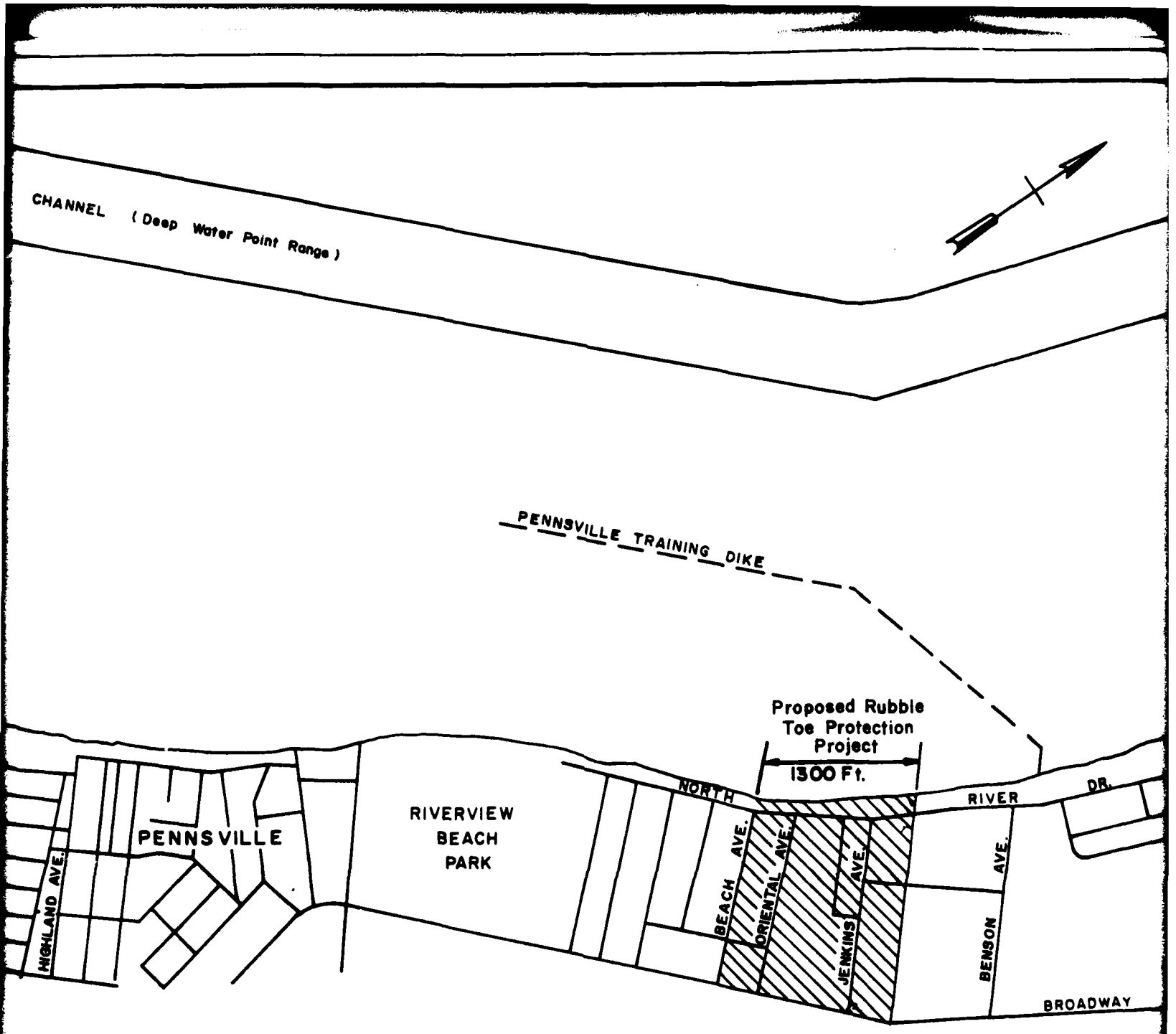
An ecological evaluation has been made following the evaluation guidance found in 40 CFR 230.4 and 230.5. Appropriate measures have been utilized in the proposed plan to minimize adverse effects on the aquatic environment resulting from placement of stone revetment. Special consideration was given to both the need for the proposed activity and to State Water Quality Standards.

9. Findings

The District Engineer has made a preliminary determination of findings that the placement of stone revetment for the mitigation of erosion and flood control at Pennsville, New Jersey, meets the Section 404(b) (1) guidelines.



TYPICAL BULKHEAD AND RUBBLE T



.5

2

1

2'

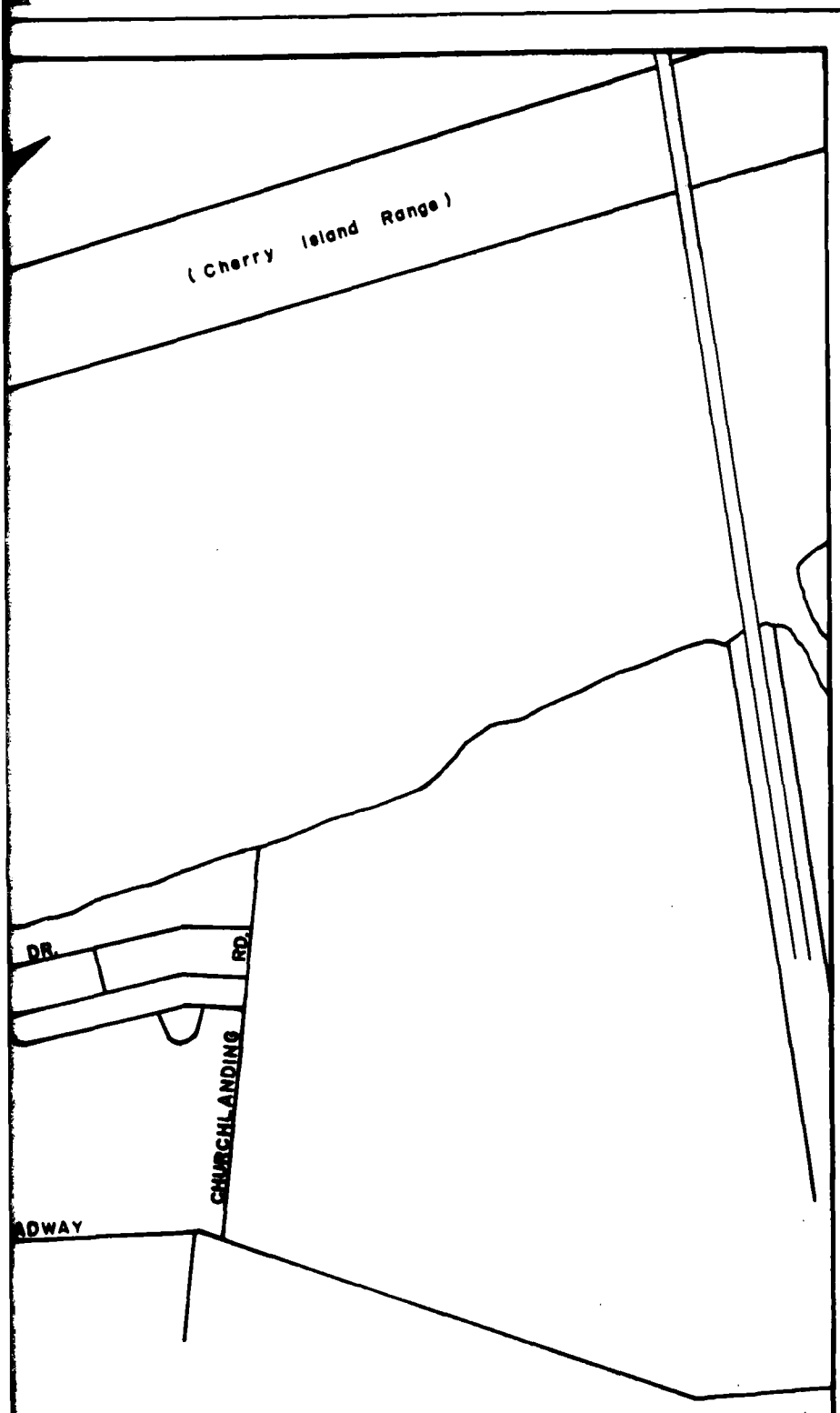
ding layer
nin. to 20lb. max.

Existing beach

LEGEND

FLOOD DAMAGE AREA

BLE TOE PROTECTION



DELAWARE RIVER BASIN
PENNSVILLE, NEW JERSEY

PROPOSED PLAN

PHILADELPHIA DISTRICT, CORPS OF ENGINEERS

FIGURE 1

APPENDIX C

CORRESPONDENCE

State of New Jersey

DEPARTMENT OF COMMUNITY AFFAIRS

JOSEPH A. LeFANTE
COMMISSIONER

363 WEST STATE STREET
POST OFFICE BOX 2768
TRENTON, N.J. 08625

September 30, 1980

Mr. D.J. Sheridan
Chief, Planning/Engineering
Division
Department of The Army
Philadelphia District Corps
of Engineers
Custom House-2D & Chestnut Streets
Philadelphia, Penna. 19106

RE: State Identifier No. OSRC-FY-81-555 Draft Abbreviated Detailed Project Report - Migration of Erosion Damages

Dear Mr. Sheridan:

The New Jersey State Clearinghouse has received and is processing your Project Notification as required by the provisions of the U. S. Office of Management and Budget Circular A-95 Revised and Chapter 85, New Jersey Laws of 1944. This project has been designated OSRC-FY-81-555.

The State Clearinghouse has assigned a 30 day review period effective with the date of this letter. This review period is consistent with our internal procedures and federal regulations relevant to your program. The appropriate state agencies have been requested to comment on your application, while the State Clearinghouse will perform its own review. If comments are received and any conflicts or issues arise, the Clearinghouse will notify you. It may be necessary to request additional information and/or to schedule a conference in order to resolve the issues prior to clearance; otherwise you are cleared at the end of the review period to forward your final application to the federal funding agency, accompanied by a copy of this letter. It is the responsibility of the applicant to attach any comments to the application forwarded to the federal agency.

Please feel free to call upon the State Clearinghouse at any time to assist you with any problems or questions you may have with the A-95 review procedure.

Very truly yours,

Richard A. Ginman
State Review Coordinator

NOTE: Please place your State Identifier Number on all further correspondence and application forms (424) so that the Clearinghouse may more efficiently process this application.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF THE COMMISSIONER
P. O. BOX 1390
TRENTON, N. J. 08625
609-292-2885

OCT 15 1980

Colonel James G. Ton
US Army Corps of Engineers
Philadelphia District
US Custom House
2nd & Chestnut Streets
Philadelphia, PA 19106

Dear Colonel Ton:

The Department of Environmental Protection has reviewed the Project Report on the Mitigation of Erosion Damages along the Delaware River in the City of Pennsville, Salem County, New Jersey.

The proposed project plan for Reach A has been found to be consistent with the Coastal Zone Management Policies and the federally approved management plan as adopted on September 30, 1980.

We agree that the construction of the proposed stone revetment in Reach A will provide stability for this area, reduce the possibility of flooding along the shoreline and in general, have an overall positive environmental impact.

We thank you for the opportunity to review and comment on this report.

Very truly yours,

DONALD T. GRAHAM
ASSISTANT COMMISSIONER

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
112 West Foster Avenue
State College, PA 16801

October 17, 1980

Colonel James G. Ton
U.S. Army Corps of Engineers
Philadelphia District
Custom House, 2nd & Chestnut Sts.
Philadelphia, PA 19106

Dear Colonel Ton:

We have reviewed the Draft Abbreviated Detailed Project Report for Mitigation of Erosion Damages at Pennsville, New Jersey, as requested by Mr. Sheridan's letter dated September 26, 1980. The document adequately describes the environmental impacts from the project. We concur with the statement of findings on Page 24 of the report.

Sincerely,

Charles J. Kulp
Field Supervisor

THE TOWNSHIP OF PENNSVILLE

SALEM COUNTY, NEW JERSEY

DONALD W. SPARKS
Member of Township Committee
46 Benson Avenue
Phone: 678-6192

90 N. BROADWAY
PENNSVILLE, NEW JERSEY 08070

November 12, 1980

Colonel James C. Ton, District Engineer
U. S. Army Corps of Engineers
Philadelphia District
Custom House
2nd and Chestnut Streets
Philadelphia, Pa. 19106

Dear Colonel Ton:

I would like to compliment you on the presentation made by the Corps of Engineers in Pennsville on October 23rd, with reference to the mitigation study of the shoreline in the Pennsville area. The Township endorses the plan presented in the report.

Some of the comments that I made at that hearing were not in the area of the mitigation study. The property at the end of Benson Avenue from the training dike South approximately 600 feet in length will be the area where the Township will be filing an application for funding from the State Department of Environmental Protection on a fifty-fifty basis in the near future. The Township Engineer is presently designing this area for either a pre-caste concrete structure or gabions. Whichever seems to be best for the area.

Thank you for your cooperation in these matters. If I may be of any further service to you, please do not hesitate to contact me.

Very truly yours,
TOWNSHIP OF PENNSVILLE

Donald W. Sparks

Donald W. Sparks
Mayor

DWS/dhg

TESTIMONY BY THE HONORABLE WILLIAM J. HUGHES, M.C., BEFORE THE U.S.ARMY CORPS OF ENGINEERS, PENNSVILLE, NEW JERSEY, OCTOBER 23, 1980

THANK YOU, MR. CHAIRMAN, I AM WILLIAM J. HUGHES, MEMBER OF CONGRESS, REPRESENTING NEW JERSEY'S SECOND CONGRESSIONAL DISTRICT. I APPRECIATE THIS OPPORTUNITY TO TESTIFY THIS EVENING IN SUPPORT OF THE PROPOSED REINFORCEMENT OF THE BULKHEAD ALONG THE DELAWARE RIVER IN PENNSVILLE.

AT THE OUTSET, I WOULD LIKE TO EXPRESS MY GRATITUDE TO THE ARMY CORPS OF ENGINEERS FOR MOVING SO EXPEDITIOUSLY ON THIS PROJECT. MY CONGRESSIONAL DISTRICT INCLUDES MORE THAN 180 MILES OF COASTLINE ALONG THE ATLANTIC OCEAN AND DELAWARE BAY, AND I HAVE MANY COMMUNITIES WHICH ARE EXPERIENCING EROSION PROBLEMS. HOWEVER, I AM NOT AWARE OF ANY WHICH IS MORE SERIOUS THAN THE EROSION PROBLEM RIGHT HERE IN PENNSVILLE. I FIRST BROUGHT THIS PROBLEM TO THE ATTENTION OF THE ARMY CORPS IN 1979, AND I AM VERY PLEASED THAT THE CORPS HAS ALREADY COMPLETED ITS ENGINEERING STUDIES AND IS MOVING TOWARDS A CONSTRUCTION START.

I HAVE THOROUGHLY REVIEWED THE PRELIMINARY PROJECT REPORT WHICH THE ARMY CORPS RELEASED IN MAY, AND DISCUSSED IT WITH THE LOCAL OFFICIALS IN PENNSVILLE. AS A RESULT, I AM PLEASED TO ANNOUNCE THAT I FULLY SUPPORT THE ARMY CORPS' PROPOSAL TO REINFORCE THE BULKHEAD ALONG THE AREA UPSTREAM FROM BEACH AVENUE. THAT SECTION HAS OBVIOUSLY SUFFERED THE MOST SEVERE EROSION, AS A RESULT

OF THE TRAINING DIKE WHICH THE FEDERAL GOVERNMENT CONSTRUCTED IN THE DELAWARE RIVER BACK IN 1942, AND THERE SEEM TO BE NO OTHER PROTECTION MEASURES AVAILABLE AT THIS TIME. BY COMPARISON, THE STATE AND LOCAL COMMUNITY ARE MOVING TO PROTECT THE HOMES AND PROPERTY ALONG THE REST OF THE SHORELINE, SO I DO NOT OBJECT TO THE CORPS' RECOMMENDATION TO LIMIT THE PROJECT TO JUST THE UPPER REACH OF THE BULKHEAD.

JUST AS IMPORTANT, I WHOLEHEARTEDLY CONCUR WITH THE CORPS' RECOMMENDATION THAT THE FEDERAL GOVERNMENT PAY THE ENTIRE COST OF THIS PROJECT, PURSUANT TO ITS MITIGATION AUTHORITY UNDER SECTION 111 OF THE RIVERS AND HARBORS ACT. I BELIEVE THE CORPS' OWN STUDIES HAVE CLEARLY SHOWN THAT THE SHORELINE EROSION AND BULKHEAD DAMAGE WERE A DIRECT RESULT OF THE FEDERAL GOVERNMENT'S CONSTRUCTION OF THE TRAINING DIKE IN THE RIVER CHANNEL. SINCE THE FEDERAL GOVERNMENT CAUSED THE PROBLEMS, THE FEDERAL GOVERNMENT IS RESPONSIBLE FOR SOLVING THEM. I MIGHT POINT OUT THAT PENNSVILLE AND THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION HAVE UNDERTAKEN SEVERAL EFFORTS OVER THE YEARS TO REPAIR DAMAGED SECTIONS OF THE BULKHEAD. WE HAVE TURNED TO THE ARMY CORPS FOR ASSISTANCE, ONLY BECAUSE THESE EFFORTS WERE NOT SUCCESSFUL IN REPAIRING THE DAMAGE ALONG THE UPPER REACH OF THE BULKHEAD.

AD-A097 594 ARMY ENGINEER DISTRICT PHILADELPHIA PA F/G 13/2
ABBREVIATED DETAILED PROJECT REPORT, MITIGATION OF EROSION DAMA--ETC(
DEC 80
UNCLASSIFIED DAEN/NAP-73873/DPR-80/12 NL

AS YOU MAY KNOW, MR. CHAIRMAN, THIS PROJECT FACES ONE POTENTIAL ROADBLOCK IN THE MONTHS AHEAD. THAT IS, A POTENTIAL LACK OF FUNDING AT THE FEDERAL LEVEL. IN HIS FISCAL 1981 BUDGET MESSAGE TO CONGRESS, PRESIDENT CARTER DID NOT RECOMMEND ANY BUDGET AUTHORITY FOR THE ARMY CORPS OF ENGINEERS FOR SECTION 111 PROJECTS. I DON'T KNOW WHY THE PRESIDENT OMITTED FUNDING FOR THAT CATEGORY, BUT I DO NOT SUPPORT THAT RECOMMENDATION. I REGRET THAT WELL-INTENTIONED FEDERAL PROJECTS, SUCH AS THE CONSTRUCTION OF THE TRAINING DIKE IN THE DELAWARE RIVER, OCCASIONALLY CAUSE SECONDARY PROBLEMS SUCH AS THE SHORELINE EROSION HERE IN PENNSVILLE. WHEN THAT HAPPENS, HOWEVER, THE GOVERNMENT CANNOT IGNORE ITS RESPONSIBILITIES TO THE LOCAL COMMUNITY.

I INTEND TO SPONSOR LEGISLATION IN CONGRESS NEXT YEAR TO APPROPRIATE ALL OF THE NECESSARY FEDERAL FUNDING FOR THIS PROJECT IN PENNSVILLE -- NOW ESTIMATED TO COST SOME $365,000. THIS PROJECT IS ECONOMICALLY JUSTIFIED, IT WILL HAVE A POSITIVE EFFECT ON THE ENVIRONMENT, IT WILL PROTECT THE SHORELINE FROM FURTHER EROSION AND FLOOD DAMAGES, AND IT IS BADLY NEEDED BY THE LOCAL COMMUNITY. FOR ALL OF THESE REASONS, I ASSURE YOU I INTEND TO DO EVERYTHING I CAN NEXT YEAR TO SECURE FULL FUNDING FOR THIS IMPORTANT FEDERAL PROJECT.

THAT CONCLUDES MY PREPARED STATEMENT, MR. CHAIRMAN. I WOULD BE PLEASED TO ANSWER ANY QUESTIONS YOU MAY HAVE.

THE TOWNSHIP OF PENNSVILLE

SALEM COUNTY, NEW JERSEY
MUNICIPAL BUILDING, 90 NORTH BROADWAY
PENNSVILLE, NEW JERSEY 08070

DONALD W. SPARKS
MAYOR

TELEPHONE
OFFICE 678-3089
HOME 678-6492

December 15, 1980

William McDevitt, Project Engineer
Department of the Army
Corps of Engineers, Philadelphia District
Custom House, 2nd & Chestnut Streets
Philadelphia, Pa. 19106

Re: Mitigation of Erosion Damages - Pennsville Township

Dear Mr. McDevitt:

The Municipal easement (Block 186, Lot 8-Q) will be available for use by the Corps of Engineers during the construction of the proposed stone toe protection, for access to the Delaware River.

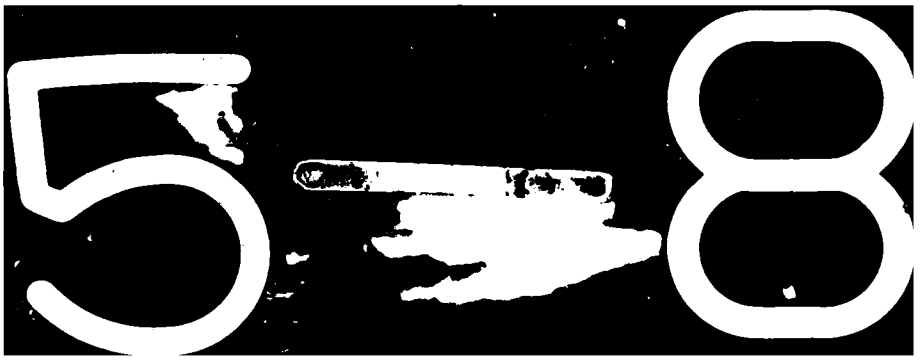
The only conditions would be that the area be restored upon completion of the project.

Very truly yours,

Donald W. Sparks

Donald W. Sparks, Mayor
Pennsville Township

DWS/lm
cc: Harry L. Symes
Township Engineer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